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## **FINDING OF NO SIGNIFICANT IMPACT**

**NAME OF ACTION:** GROUND WAVE EMERGENCY NETWORK  
SOUTHERN UTAH RELAY NODE

### **DESCRIPTION OF PROPOSED ACTION ALTERNATIVES:**

The U.S. Air Force plans to construct a radio communications relay node in southern Utah (Kane County) as part of the Ground Wave Emergency Network (GWEN) communications system. Six action alternatives associated with six candidate GWEN sites (CGSs) in southern Utah and the no action alternative have been considered and evaluated in an environmental assessment (EA).

GWEN is a radio communications system designed to relay emergency messages between strategic military areas in the continental United States. The system is immune to the effects of high-altitude electromagnetic pulse (HEMP) energy surges caused by nuclear detonations in the ionosphere that would disrupt conventional communications equipment. A failure of such equipment would prevent timely communications among top military and civilian leaders and strategic Air Force locations and prevent U.S. assessment and retaliation during an attack. GWEN is an essential part of a defense modernization program to upgrade and improve our nation's communications system, thereby strengthening deterrence.

The GWEN system is a network of relay nodes, receive-only stations, and input/output stations. The relay node in southern Utah would be part of the Final Operational Capability (FOC) phase of the GWEN system and would establish essential links with adjacent nodes in the network.

In September 1987, the U.S. Air Force Electronic Systems Division, Hanscom Air Force Base, Massachusetts published a Final Environmental Impact Statement (FEIS) for the GWEN FOC that addressed the system as a whole and identified expected environmental effects common to all sites. Section 5 of the FEIS described a siting process that is designed to minimize the potential for environmental impacts. This process has three distinct phases: network definition, regional screening, and individual site evaluation. Network definition identified the need for a relay node in southern Utah. Regional screening resulted in the identification of six CGSs in southern Utah that met the exclusionary and evaluative criteria described in that FEIS. Individual site evaluation examined the relative suitability of the CGSs through site-specific technical studies. The EA is a part of the third phase and is tiered from that FEIS. It addresses the potential environmental effects of the six action alternatives and the no action alternative.

The proposed relay node in southern Utah will be an unmanned facility located on approximately 11 acres of land and, once constructed, will resemble an AM radio broadcast station. The facility will consist of a 299-foot-tall, low-frequency (LF) transmitter tower, three equipment shelters, an access road, and associated fences. The tower will be supported by 24 guy wires, including 12 top-loading elements. An equipment shelter at the tower base will contain an antenna tuning unit. An 8-foot-high chain link fence topped with barbed wire will surround the tower base and associated equipment shelter. A radial ground plane, composed of 100, 0.128-inch-diameter copper wires buried about 12 inches underground, will extend out about 330 feet from the tower base. A 4-foot-high fence will be installed around the perimeter of the copper radials.

A second equipment area located at the site perimeter will contain two shelters housing a back-up power group (BUPG) with two internal fuel storage tanks and radio processing equipment. The BUPG will operate during power outages and for testing purposes. An LF receive antenna, consisting of a pair of 4-foot-diameter rings mounted on a 10-foot pole, and an ultrahigh-frequency (UHF) antenna, used for communicating with airborne input/output terminals and consisting of a 9-foot-high whip-like antenna mounted on a 30-foot-high pole, will also be located in this area. An 8-foot-high chain link fence topped with barbed wire will enclose the entire equipment area. A 10-foot-wide gravel road will connect this area to the tower base. A 12-foot-wide gravel road will provide access to the site from a public road.

The station will use existing commercial three-phase electric power and telephone service. Power and telephone service will be brought to the site through either overhead or buried lines, depending on local utility practices. In its ready status, the antenna will transmit in the LF radio band at 150 to 175 kilohertz for a total of 6 to 8 seconds per hour.

Three of the six action alternatives are discussed in this Finding of No Significant Impact (FONSI). The impacts on visual resources are significant at the BLM (CGS-2), Little (CGS-3), and Francis and James Ltd. (CGS-4) sites, so they are not considered in this FONSI.

## **ANTICIPATED ENVIRONMENTAL EFFECTS**

The EA evaluated potential impacts to the physical, biological, and socio-cultural environment from construction and operation of the relay node.

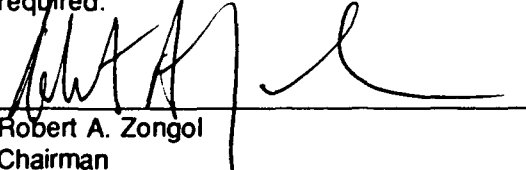
The project would have no significant impacts on physical resources. Erosion and increased runoff would be minimized by using proper erosion control techniques during construction and by restoring the vegetation to preexisting natural conditions. Impacts to mineral resources would be minor. Paleontological resources are not likely to occur on any of the sites; therefore significant impacts to them are not anticipated. No prime farmland would be removed from production. Water quality would not be significantly affected because increases in copper concentrations due to corrosion of the ground plane would be negligible. Air quality would not be significantly affected. During construction, temporary and insignificant increases in emissions would occur, and during operation, emissions from the BUPG would not be sufficient to result in violation of air quality standards.

The project would have no significant impacts on biological resources. The sites are located on grazing land or former grazing land and do not contain sensitive wildlife habitat. None of the sites contains wetlands and none is within a 100-year floodplain. Informal consultation with the U.S. Fish and Wildlife Service indicated that the project would not affect any federally listed threatened or endangered species. The Utah Division of Wildlife Resources indicated that no state-listed rare, threatened, or endangered species or unique biological communities would be affected. Bird-tower collisions may occur but would not be significant because the tower would be located away from primary bird habitats and migratory routes.

The project would have no significant impacts on socio-cultural resources. Construction would have a small, beneficial impact on the local economy, in part by providing temporary employment for contractors and construction workers. Community support systems would not be significantly affected. Land use and noise impacts would not be significant. The relay node signal would not interfere with commercial television or radio broadcasts, amateur radio operations, garage door openers, or pacemakers. Radio-frequency emissions outside the fenced area around the tower base would not pose a health hazard to humans or animals. The Arizona and Utah Historical Societies were consulted and concurred that the project would not affect significant cultural resources. Significant impacts to Native American traditional, religious or sacred sites are not anticipated. A visual analysis conducted in accordance with the criteria developed in the FOC FEIS concluded that the relay node facility would not cause significant visual impacts.

## **CONCLUSIONS:**

No significant impacts to the surrounding environment would be caused by construction and operation of the proposed relay node on the BLM/City of Kanab (CGS-5), Chamberlain (CGS-7), or Hamblin (CGS-8) site. Therefore, an environmental impact statement for a GWEN relay node at the cited locations in southern Utah is not required.

  
Robert A. Zongol  
Chairman

HQ ESC Environmental Protection Committee

  
Date

## PREFERRED GWEN SITE REPORT SOUTHERN UTAH

The U.S. Air Force is proposing to construct a relay node for the Ground Wave Emergency Network (GWEN) in southern Utah. The Air Force has followed the siting process described in Section 5 of the Final Environmental Impact Statement (FEIS) for the Final Operational Capability (FOC) phase of the GWEN program to identify alternative Candidate GWEN Sites (CGSs). The six CGSs identified in southern Utah are referred to as the BLM, Little, Francis & James, BLM/City of Kanab, Chamberlain, and Hamblin sites.

This report summarizes the process of selecting the preferred site from the six CGSs. This PGSR, along with a site-specific Environmental Assessment (EA) and Finding of No Significant Impact (FONSI), is being distributed for information and comment in compliance with the Air Force's process of Interagency and Intergovernmental Coordination for Environmental Planning (IICEP).

Operational, environmental, and developmental suitability; construction and real estate acquisition costs; and public comments and concerns are all factors which have been considered in arriving at the selection of the preferred site.

Without an **operationally suitable** location, connectivity of the relay node in southern Utah to the GWEN network cannot be achieved. Ground conductivity measurements are acceptable at all six CGSs. During the site-specific studies, no radio frequency interference was detected in the GWEN frequency bands which would interfere with the operation of the GWEN receiver. Also, operations at any of the sites would pose no interference with other known systems. Therefore, all six CGSs are operationally suitable.

The next major factor considered in the selection of the preferred site was **environmental suitability**. The environmental suitability of each CGS was determined from information provided by an independent field analysis and is documented in the EA. The EA for the six CGSs was completed in March 1993. The environmental analysis found that construction of the GWEN relay node at the BLM, Little, or Francis & James sites would create significant visual impacts to views from Johnson Canyon Road, a state-designated scenic backway. Construction of the GWEN relay node at the Little site would also create a significant visual impact to views of Crescent Butte, a scenic feature on BLM land protected under the BLM Visual Resources Management Plan. No significant impacts would result from construction of the GWEN relay node on the BLM/City of Kanab, Chamberlain, or Hamblin sites. Therefore, a FONSI for these three sites was completed on 6 April 1993. Thus, three of the six CGSs are environmentally suitable.

The next factor to consider in the selection of the preferred site is **developmental suitability**. The FAA has approved construction of the GWEN relay node at either the BLM, Little, Francis & James, or Hamblin sites but has disapproved construction at the BLM/City of Kanab or Chamberlain sites. Thus, of the three operationally and environmentally suitable sites, only the Hamblin site is developmentally suitable as well.

**Construction cost** is also a consideration in the selection of the preferred site. Construction costs for the BLM/City of Kanab and Chamberlain sites are unacceptably high, making them only marginally acceptable in terms of construction cost. Construction costs for the BLM, Little, Francis & James, and Hamblin sites are

acceptable but vary considerably. In terms of lowest construction cost, the BLM site is favored, followed by the Little, Francis & James, and Hamblin sites, respectively.

Real estate negotiations have been completed for the Chamberlain and Hamblin sites. Both landowners prefer to sell their property. The BLM and BLM/City of Kanab sites are public lands for which the Air Force would negotiate with the respective government owner if the sites were selected. Negotiations have been suspended for the Little and Francis & James sites.

With operational, environmental, and developmental factors evaluated and acquisition and construction costs considered, the Air Force prefers the Hamblin site. The Hamblin site is preferred because it is operationally, environmentally, and developmentally suitable; construction costs are acceptable; and negotiations have been completed with the landowner.

I have therefore selected the Hamblin site as the Air Force's preferred site for development as the GWEN relay node in southern Utah. After reviewing the information received during the IICEP process, I will direct the final land acquisition activities and construction of the GWEN relay node.

  
STEPHEN T. MARTIN, LT COL, USAF  
Program Manager, GWEN

12 Apr 93  
(Date)

**GROUND WAVE EMERGENCY NETWORK  
FINAL OPERATIONAL CAPABILITY**

**ENVIRONMENTAL ASSESSMENT  
FOR  
SOUTHERN UTAH RELAY NODE  
SITE NO. RN 8C919UT**

**18 March 1993**

**93-18568**



**Electronic Systems Center  
Air Force Material Command, USAF  
Hanscom AFB, Massachusetts 01731-1623**

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FINAL OPERATIONAL CAPABILITY

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## **SUMMARY**

The Ground Wave Emergency Network (GWEN) is a radio communication system designed to relay emergency messages between strategic military areas in the continental United States. The system is immune to the effects of high-altitude electromagnetic pulse (HEMP) energy surges caused by nuclear bursts in the ionosphere that would disrupt conventional communications equipment such as telephones and shortwave radios. A failure of such equipment would prevent timely communications among top military and civilian leaders and strategic Air Force locations and prevent U.S. assessment and retaliation during an attack. GWEN is an essential part of a defense modernization program to upgrade and improve our nation's communications system, thereby strengthening deterrence.

The GWEN system consists of a network of relay nodes, receive-only stations, and input/output stations. Each relay node, such as the one proposed in southern Utah, consists of a guyed radio tower facility similar to those used by commercial AM broadcast transmitters.

A Final Environmental Impact Statement (FEIS) for the GWEN Final Operational Capability (FOC) was published in September 1987 by the Electronic Systems Division, Hanscom Air Force Base, Massachusetts. That FEIS addressed the GWEN system as a whole, identifying expected environmental effects common to all sites. Section 5, beginning on page 5-1 of the FEIS describes a siting process that is designed to minimize the potential for environmental impacts. This process has three distinct phases: network definition, regional screening, and individual site evaluation.

Phase 1, network definition, identified the geographic coordinates that met the operational needs and technical constraints of the network. Each set of coordinates became the center of a circular site search area (SSA) with a 9-mile radius (250 square miles). The SSA discussed in this Environmental Assessment (EA) was centered approximately 8 miles east of the city of Kanab in Kane County in southern Utah at latitude 37.02° N and longitude 112.38° W. The SSA includes portions of

Kane County, Utah, and Coconino County, Arizona. The only city in the SSA is Kanab, Utah. Fredonia, Arizona is just outside the southwest border of the SSA.

Phase 2, regional screening, involved the application of exclusionary and evaluative criteria to the SSA to avoid environmentally sensitive areas. The remaining areas, called potential areawide sites (PAWS), became the focus of the siting process. The field investigation for southern Utah was conducted in April 1990. Thirteen sites were identified during automobile-based surveys as potential candidate GWEN sites (PCGSs). All PCGSs were located in Kane County, Utah. Attempts were made to contact the owners of the sites to determine their interest in selling or leasing land to the Government. Rights-of-entry (ROEs) were granted to investigate five PCGSs. Three additional sites under the jurisdiction of the Bureau of Land Management (BLM) did not require signed ROEs. Following evaluation against the environmental siting criteria set forth in the FEIS, six of the eight PCGSs were recommended as candidate GWEN sites (CGSs) for further review. These CGSs were described in the Preliminary Site Evaluation Report (P'SER) of June 11, 1990.

Phase 3, individual site evaluation, involves evaluating the relative suitability of the candidate sites through site-specific technical studies. This EA is a product of those evaluations and discusses the six siting alternatives in southern Utah. It addresses only those criteria that apply to the candidate sites. The seventh alternative, no action, would impair performance of the GWEN system but leave the environment unchanged.

To be suitable for construction and operation, a site should measure at least 700 by 700 feet (approximately 11 acres), be relatively level and undeveloped, be free of natural or man-made obstructions, and have soils capable of supporting relay node structures. The site should also be close to all-weather roads, commercial three-phase power, and telephone lines to minimize costs. To operate effectively, the site must be located at least a minimum distance from obstructions that could affect reception and transmission. These include buildings and towers, high-voltage power lines, and other communications systems or sources of radio-frequency interference.

Specific minimum distances depend on height and power levels of identified obstructions or interfering sources.

This EA shows that construction and operation of a GWEN relay node would have significant visual impacts on the BLM (CGS-2), Little (CGS-3), and Francis and James Ltd. (CGS-4) sites. These impacts are discussed in Sections 4.2, 4.3, and 4.4 of this EA.

The project would have no significant impacts if built on the BLM/City of Kanab (CGS-5), Chamberlain (CGS-7), or Hamblin (CGS-8) site. During the 6-week construction period, the project would cause temporary and insignificant air quality and noise impacts and slight increases in traffic. It would have a small, beneficial impact on the local economy, in part because it would provide temporary employment for contractors and construction workers. If built on any of the above three sites, the project would have no significant impacts on air quality; water quality; land use; mineral resources; known paleontological resources; biological resources, including threatened and endangered species; or cultural resources that are listed, eligible, or potentially eligible for listing on the National Register of Historic Places. Visual impacts would be not be significant. Radio-frequency emissions outside the fenced area around the tower base would not pose a health hazard to humans or animals.

## **1.0 PURPOSE AND NEED FOR ACTION**

The proposed action covered by this Environmental Assessment (EA) includes construction and operation of a relay node of the Ground Wave Emergency Network (GWEN) in southern Utah (see Figure 1.1 of this EA). This relay node will provide essential connections with adjacent nodes in the network. The major features of a GWEN relay node and associated environmental impacts common to all sites are addressed in the Final Environmental Impact Statement (FEIS) for the Final Operational Capability (FOC) phase of GWEN, which was published in September 1987 by the Electronic Systems Division, Hanscom Air Force Base, Massachusetts. This EA is tiered from that FEIS and addresses site-specific conditions at the candidate GWEN sites (CGSs) for this particular site search area (SSA).

The purpose of GWEN is to provide to the President and the National Command Authority a strategic communications network that is immune to the effects of high-altitude electromagnetic pulse (HEMP) and will carry critical attack warning and force execution data. As a result, GWEN will remove any possibility of potential aggressors taking advantage of the electromagnetic pulse generated by a high-altitude nuclear burst. A HEMP surge would disrupt the nation's electric power line transmission capability, cripple electronic devices, and adversely affect skywave communications networks based on conventional electronics. GWEN provides a low-frequency (LF) ground wave communication network that will not be affected by HEMP effects. It thereby strengthens deterrence by removing the option of beginning an attack against the United States by using HEMP effects.

A partial GWEN network, called the Thin Line Connectivity Capability (TLCC), has been completed. It contains 8 input/output stations, 30 receive-only stations, and 54 relay nodes. The TLCC provides a limited level of HEMP-protected communications to strategic forces and the National Command Authority.

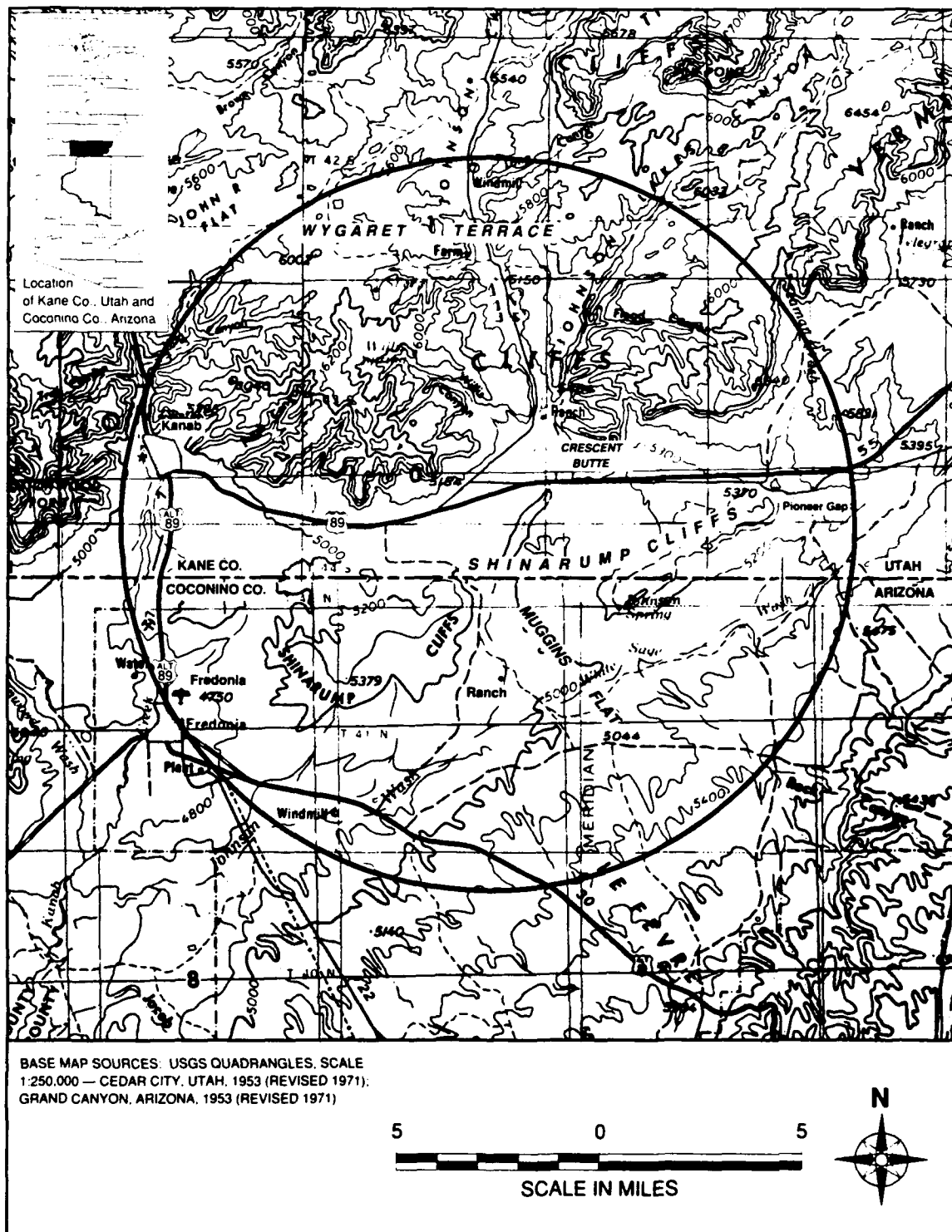


FIGURE 1.1 SOUTHERN UTAH SITE SEARCH AREA (SSA), KANE COUNTY, UTAH AND COCONINO COUNTY, ARIZONA

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The FOC phase of GWEN will add 29 relay nodes. The FOC will allow communication along several routes, thereby enhancing system availability and ensuring that vital communications will be maintained.



## **2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION**

The six action alternatives are site-specific applications of the standard relay node design presented in the FEIS. Consequently, they share a number of features that are discussed in Section 2.1 of this EA. The site-specific features are discussed in Sections 2.2 through 2.7 of this EA. Site descriptive data was obtained during field investigations conducted in April 1990. Figure 2.1 of this EA shows the six CGSs in relation to the major features of the SSA. Figure 2.2 and Appendix B of this EA show the locations of the CGSs in relation to roads and surrounding topography, respectively.

### **2.1 Common Features of the Action Alternatives**

#### **2.1.1 Site Selection Process**

The process used to select sites is described in Section 5, beginning on page 5-1 of the FEIS. This process has three distinct phases: network definition, regional screening, and individual site evaluation. Appendix A of this EA provides a diagram of the site selection process, and the environmental criteria used in this process are defined in Tables 5-1 and 5-2, pages 5-7 through 5-14 of the FEIS.

Phase 1, network definition, involved locating network nodes to optimize their performance while serving a predetermined number of users. A typical GWEN ground wave has an effective range of about 150 to 200 miles. Thus, relay nodes could not be located independently; changing the location of one would affect the connectivity with other nodes in the network. Once the optimal coordinates of the relay nodes were identified, a 9-mile-radius SSA was defined around each point to provide suitable opportunity for siting a relay node near that point. The 9-mile radius was chosen because it provided a reasonably sized search area consistent with the technical constraints on the relay node. If a significant portion of an SSA fell within an environmentally highly sensitive area such as a national park or wilderness area, an alternative was selected and its connectivity evaluated. This process was repeated until all relay nodes fell outside such areas.

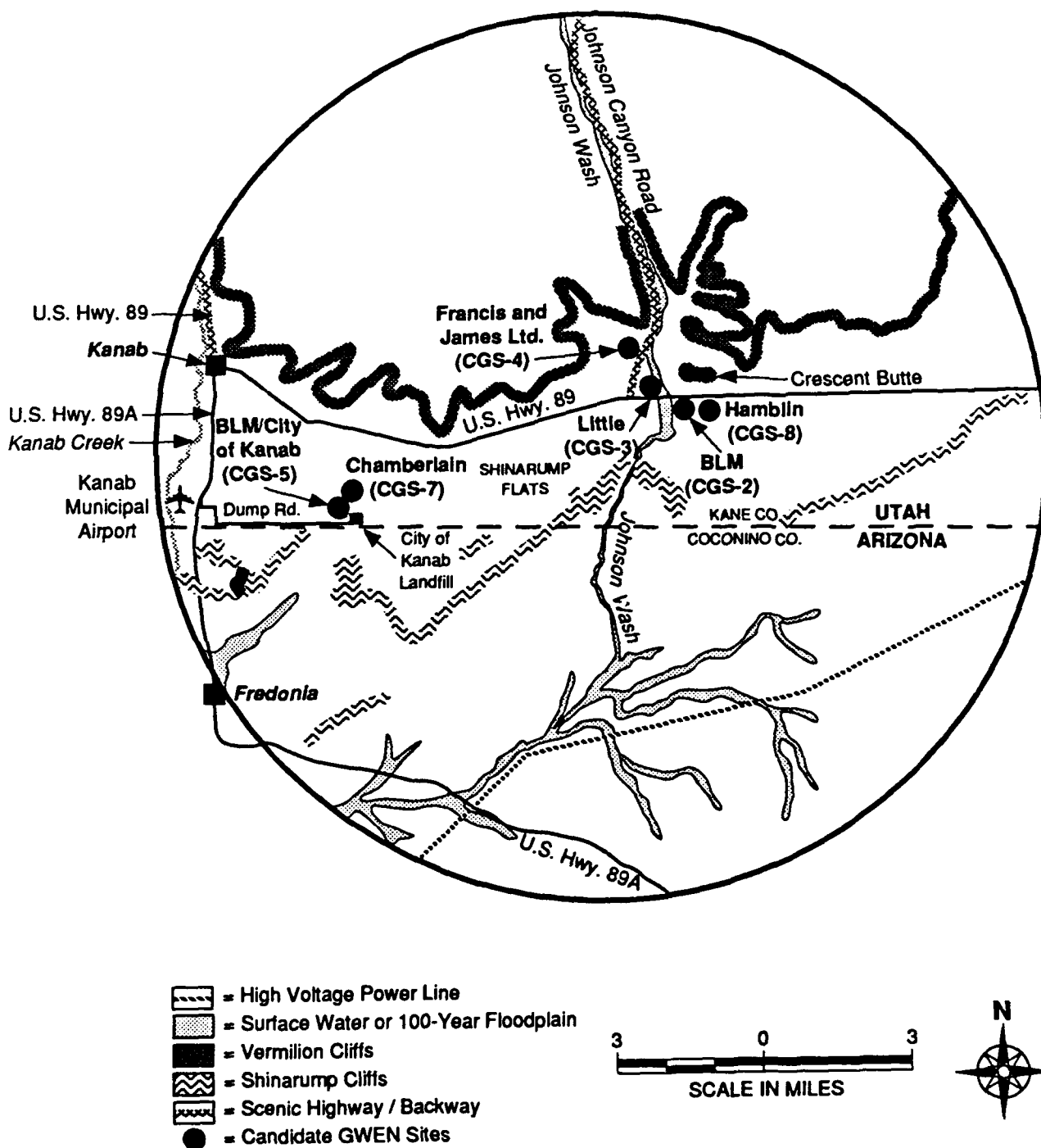


FIGURE 2.1 LOCATIONS OF CANDIDATE GWEN SITES (CGSs) RELATIVE TO SELECTED MAJOR FEATURES AND ROADS WITHIN THE SOUTHERN UTAH SITE SEARCH AREA

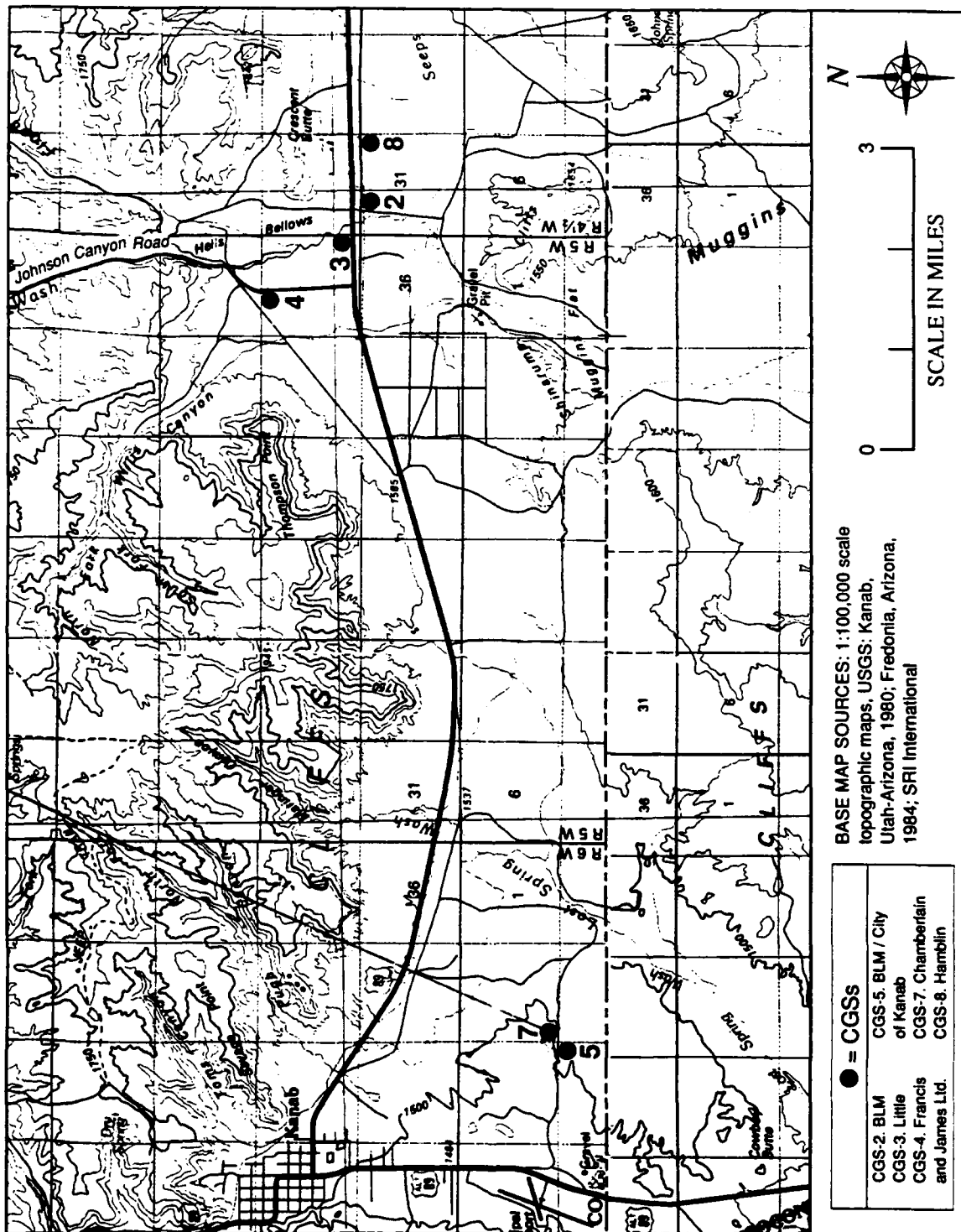


FIGURE 2.2 LOCATIONS OF CANDIDATE GWEN SITES (CGSs) IN KANE COUNTY, UTAH

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Phase 2, regional screening, involved the application of exclusionary and evaluative criteria to the SSA to identify areas that might contain operationally acceptable sites outside environmentally sensitive areas. The resulting search areas, called potential areawide sites (PAWS), were submitted to appropriate federal, state, and local officials for review. The PAWS were then redefined, as appropriate, by incorporation of the comments of the reviewers, and a field investigation was conducted to find suitable candidate sites for a GWEN relay node within the redefined PAWS.

The field investigation for southern Utah was conducted in April 1990. Thirteen sites were identified during automobile-based surveys as potential candidate GWEN sites (PCGSs). All PCGSs were located within Kane County, Utah, due to a lack of three-phase power in the portions of the SSA located in Coconino County, Arizona. Attempts were made to contact the owners of the sites to determine their interest in selling or leasing land to the Government. Rights-of-entry (ROEs) were granted to investigate five PCGSs. Three additional sites under the jurisdiction of the Bureau of Land Management (BLM) did not require signed ROEs. Following evaluation against the environmental siting criteria set forth in the FEIS, six of the eight PCGSs were recommended as CGSs for further review.

Phase 3, individual site evaluation, of which this EA is a part, is then used to determine the relative suitability of the candidate sites through site-specific technical studies. This EA presents the results of the environmental portions of those studies and covers site-specific impacts associated with construction of a relay node in southern Utah. These are summarized in Sections 4.2 through 4.7 of this EA. The findings of this EA and site-specific studies of operational parameters will be used to select a preferred GWEN site (PGS).

### **2.1.2 Relay Node Construction and Operation**

A typical relay node site is located on approximately 11 acres of land (see Figure 2.3 of this EA). It is an unmanned facility consisting of a 299-foot-tall, three-sided, 2-foot-wide LF transmitter tower, three equipment shelters, an access road, and associated fences.

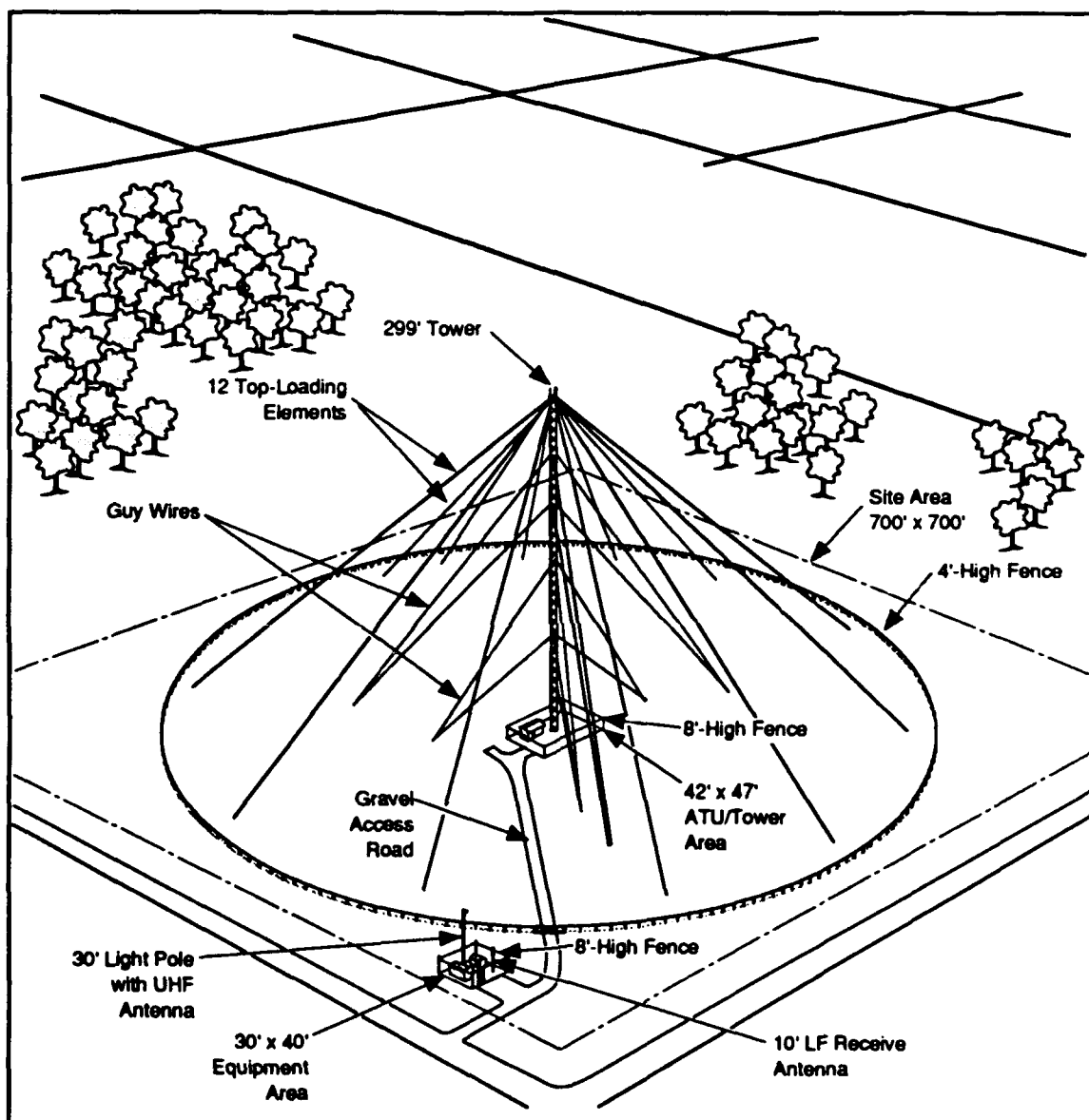


FIGURE 2.3 TYPICAL LAYOUT OF FOC RELAY NODE STATION

The tower has a base insulator and lightning protection and is supported by 24 guy wires, including 12 top-loading elements to further strengthen the signal and provide additional structural support.

These guy wires and top-loading elements are attached to the tower and 18 buried concrete anchors. The sizes of these anchors and their depth of burial varies with local soil and bedrock properties. However, the guy-wire anchors typically are rectangular blocks buried 5 feet below the surface. If bedrock occurs at or near the surface, the anchors are special rock-embedded rods. The tower base is concrete with a cross-section area resembling an inverted T. The size of this foundation is determined by soil conditions.

A radial ground plane, composed of 100 buried copper wires, extends out from the base of the tower. Each wire is 0.128 inch in diameter, about 330 feet long, and buried approximately 12 inches underground. The ground plane helps to strengthen the broadcast signal, and the number and length of the wires depend on the soil conductivity at the site. A 4-foot-high fence is installed around the perimeter of the ground plane to protect the ground plane and guy anchors and to prevent inadvertent exposure to electric shock resulting from the buildup of static electric charge.

In addition to the main tower, the relay node has two other antennas. One is an LF receive antenna made up of a pair of 4-foot-diameter rings mounted on a 10-foot pole. The second is an ultrahigh-frequency (UHF) antenna used for communicating with airborne input/output terminals. It is a 9-foot-high whip-like antenna mounted on a 30-foot-high pole. Both antennas are located within the equipment area at the perimeter of the site, which is enclosed by an 8-foot-high fence.

The siting and design of the tower are coordinated with the Federal Aviation Administration (FAA) to ensure compliance with FAA standards and regulations. The tower is equipped with a white strobe light at the top, which emits 40 flashes per minute and is rated at 20,000 candelas for daytime and twilight use and 2,000

candelas for nighttime use. To minimize glare at ground level, the light is focused upward and horizontally outward.

GWEN operates intermittently in the LF radio band at 150 to 175 kilohertz (kHz). For comparison, the low end of the AM band for commercial broadcasts is 530 kHz. The peak broadcast power for each GWEN tower is from 2,000 to 3,000 watts, depending on local soil conditions. In its ready status, GWEN typically transmits between 6 and 8 seconds per hour. GWEN does not interfere with commercial television, radio broadcasts, amateur radio operations, garage door openers, or pacemakers, as noted in Section 2.1.1.1, page 2-3 of the FEIS.

All equipment shelters are anchored to concrete pads. One shelter, located at the base of the tower, houses the antenna tuning unit (ATU). Two other shelters are located side by side in the equipment area enclosed at the perimeter of the property. One houses radio processing equipment, and the other houses a 70-horsepower, back-up diesel generator and two aboveground fuel tanks. The generator operates 2 hours per week for testing purposes and during power outages. Locked, 8-foot-high chain link fences topped with barbed wire secure the equipment shelter areas at the base of the tower and at the perimeter of the site to provide safety and to inhibit unauthorized entry. A 12-foot-wide gravel road provides access to the equipment area enclosure at the perimeter of the property. A 10-foot-wide gravel road leads from the equipment enclosure to the tower.

Fuel is stored in two aboveground steel tanks inside the generator shelter. Tank capacities are 559 gallons and 461 gallons. Each tank pipes fuel separately to the back-up power group (BUPG) and is equipped with two outlet shut-off valves, one controlled manually and one controlled automatically. If a leak occurs, fuel will flow into a floor drain leading to a tightly capped pipe extending outside the BUPG. Once approximately 2 gallons of fuel accumulate in the pipe, a "liquid spill" signal is sent to the GWEN Maintenance Notification Center, which will dispatch maintenance personnel. However, if a leak were not detected, an explosion inside the shelter would be extremely unlikely due to the high flash point of diesel fuel. If a tank at the GWEN station failed, the entire contents of one tank could be released and

contained inside the BUPG shelter. Refer to Section 4.12.1.1, page 4.12-1 of the FEIS for further discussion on diesel fuel spills and leaks.

The station uses existing commercial three-phase electric power and telephone service, but does not require water, septic, or sewer systems. Power and telephone service are brought to the site through either overhead or buried lines, depending on local utility practices. Power and telephone service are generally brought underground from the site boundary to the equipment shelter area.

Temporary increases in air pollutant emissions will occur during construction, primarily from greater use of heavy machinery than is required in normal farming operations. Emissions resulting from operations of the facility will be limited to the operation of the BUPG, which will operate only 2 hours every week for testing purposes and for additional periods as required during power outages. Thus, the generator will operate for a total of 152 hours per year, if commercial power outages totaled 48 hours. If the generator runs at 100 percent load during the projected 152-hour operating time, total emissions in one year will be less than 350 pounds per pollutant, as documented in Section 4.3.1, page 4.3-1 of the FEIS.

Noise levels generated by construction equipment are discussed in Section 4.5.1.1, beginning on page 4.5-1 of the FEIS. Under worst-case assumptions, levels could reach 78 dBA at the site boundary from on-site activity and 92 dBA at distances of 50 feet from equipment installing the off-site access road. Noise generated during GWEN operation would come from the BUPG, which will operate only 2 hours per week and during commercial power outages. The BUPG will be located at least 50 feet within the site boundary with its exhaust side oriented toward the tower area. Noise levels due to intermittent operation of the BUPG will be less than 72 dBA at the site boundary, which is within the standards typically set for lands under agricultural use (70 to 75 dBA). At 50 feet beyond the site boundary, the noise level would drop below 65 dBA, which is within the standards typically set for residential and mixed residential/agricultural use (55 to 65 dBA). These noise levels and standards are discussed in Section 3.5.3, page 3.5-2 and Section 4.5.1, pages 4.5-1 through 4.5-6 of the FEIS.



Construction will require as many as 20 workers at any given time and take about 6 weeks. Standard earth-moving and erection equipment will be used, as detailed in Table 2-1, page 2-14 of the FEIS. Erosion control techniques that are consistent with local practices will be used during construction. Vegetation removal and grading at any of the sites would be minimal. The site's vegetation will be restored to its preexisting natural vegetation.

After construction is completed, personnel requirements will be limited to periodic maintenance by a contractor who will service the equipment, cut the surface growth, remove snow from the access road, and perform other services as needed. Security services will be arranged with local authorities. The projected life of the facility is 15 to 25 years. Upon decommissioning, the tower and other structures will be removed, as discussed in Section 2.1.4, page 2-18 of the FEIS.

## **2.2 Alternative 1: BLM Site (CGS-2)**

The BLM site is located in the northeast quarter of the northwest quarter (NE1/4 NW1/4) of Section 31 in Township 43S, Range 4-1/2W. The site is 16 feet south of an unnamed east-west road that is approximately 500 feet south of and parallel to U.S. Highway 89 and 0.75 mile east of the intersection of Johnson Canyon Road and U.S. Highway 89. Access would be from the unnamed east-west road; a 16-foot access road would be required.

Three-phase power would be obtained from overhead lines adjacent to the northern boundary of the site. Telephone lines would be connected to an underground cable 526 feet north of the site, along the south side of U.S. Highway 89.

Grazing privileges are owned by a third party. There are no additional leases or other third party interests.

Appendix B, Figure B.1 of this EA, provides a map showing the surrounding topography.

### **2.3 Alternative 2: Little Site (CGS-3)**

The Little site is located in the SE1/4 SE1/4 of Section 25, Township 43S, Range 5W. The site is 130 feet north of U.S. Highway 89, and 2,000 feet east of the intersection of Johnson Canyon Road and U.S. Highway 89. Access would be from U.S. Highway 89 and would require upgrading 130 feet of existing road.

Three-phase power would be obtained from overhead lines adjacent to the southern boundary of the site. Telephone lines would be connected to an underground cable 204 feet south of the site, along the south side of U.S. Highway 89.

There are no leases or third party interests.

Appendix B, Figure B.2 of this EA, provides a map showing the surrounding topography.

### **2.4 Alternative 3: Francis and James Ltd. Site (CGS-4)**

The Francis and James Ltd. site is located in the NE1/4 NW1/4 of Section 25, Township 43S, Range 5W. The site is 38 feet west of Johnson Canyon Road, and 4,000 feet north of the intersection of Johnson Canyon Road with U.S. Highway 89. Access would be from Johnson Canyon Road; a 38-foot access road would be required.

Three-phase power would be obtained by upgrading existing single-phase overhead lines along Johnson Canyon Road beginning 620 feet south of the site, on the east side of Johnson Canyon Road. Telephone lines would be connected to an underground cable on the south side of U.S. Highway 89, approximately 4,036 feet from the southern boundary of the site.

Oil and gas rights are held by the BLM. There are no leases or other third party interests.

Appendix B, Figure B.3 of this EA, provides a map showing the surrounding topography.

## **2.5 Alternative 4: BLM/City of Kanab Site (CGS-5)**

The BLM/City of Kanab site is located in the NE1/4 NE1/4 of Section 10, Township 44S, Range 6W, in the city of Kanab roughly 1,800 feet north of the Utah-Arizona border. The site is 1.2 miles east of U.S. Highway 89A. Access would be from an unpaved vehicular trail via an unnamed road that leads to the Kanab City Landfill from U.S. Highway 89A. Access to the site would require upgrading 1,780 feet of the existing trail, starting at the landfill entrance.

Three-phase power would be obtained from overhead lines 40 feet east of the eastern boundary of the site. Telephone service would be provided by installing 7,700 feet of new lines, which would be connected to an underground cable that runs along U.S. Highway 89A.

The site is currently leased to the city of Kanab. There are no other leases or third party interests.

Appendix B, Figure B.4 of this EA, provides a map showing the surrounding topography.

## **2.6 Alternative 5: Chamberlain Site (CGS-7)**

The Chamberlain site is located in the SW1/4 SW1/4 of Section 2, Township 44S, Range 6W, in the city of Kanab, 2,500 feet north of the Utah-Arizona border. The site is 1.3 miles east of U.S. Highway 89A. Access would be from an unpaved vehicular trail via a road which leads to the Kanab City Landfill from U.S. Highway 89A. From the landfill entrance, access to the site would require upgrading 2,615 feet of the existing trail.

Three-phase power would be obtained from overhead lines 50 feet west of the western boundary of the site. Telephone service would be provided by installing 8,450 feet of new lines, which would be connected to an underground cable running along U.S. Highway 89A.

There are no leases or third party interests.

Appendix B, Figure B.5 of this EA, provides a map showing the surrounding topography.

## **2.7 Alternative 6: Hamblin Site (CGS-8)**

The Hamblin site is located in the NE1/4 NE1/4 of Section 31 in Township 43S, Range 4-1/2W. The site is 107 feet south of an unnamed east-west road that is approximately 500 feet south of and parallel to U.S. Highway 89. Access would be from the east-west road; an 107-foot access road would be required.

Three-phase power would be obtained from a substation situated on the south side of U.S. Highway 89, 3,000 feet northwest of the site. Supplying three-phase power to the site would require upgrading 3,000 feet of existing single-phase line and constructing 60 feet of new three-phase line. Telephone service would be provided by installing 3,750 feet of new lines, which would be connected to an underground cable running along the south side of U.S. Highway 89.

There are no leases or third party interests.

Appendix B, Figure B.6 of this EA, provides a map showing the surrounding topography.

## **2.8 No Action Alternative**

The no action alternative is deletion of the southern Utah relay node from the GWEN network. Adoption of this alternative would mean a consequent degradation in the performance of the system due to a lack of connectivity to other nodes in the system.

### **3.0 AFFECTED ENVIRONMENT**

This section discusses the environmental setting of the proposed GWEN project in southern Utah. Section 3.1 of this EA describes the general characteristics of the SSA, and Sections 3.2 through 3.7 of this EA describe the unique characteristics of each CGS within the SSA. Site descriptive data was obtained during field investigations conducted in April 1990. U.S. Geological Survey 7.5 minute topographical maps were used as data sources for distances, physiographic features, and topography (USGS, 1985, 1987a-e, and 1988a-d).

#### **3.1 Site Search Area**

Presented below is information on the physical, biological, and socio-cultural settings of the SSA.

##### **3.1.1 Physical Setting**

The SSA for southern Utah is a circular, 250-square-mile area in Kane County, Utah, and Coconino County, Arizona, centered approximately 8 miles east of the city of Kanab, in the Colorado Plateau subdivision of the Intermountain Plateaus physiographic province of the United States.

The topography of the northern third of the SSA is a broad plateau that is dissected by deep canyons and delineated by the Vermilion Cliffs along its southern edge. In the central portion of the SSA, just south of these cliffs, are the Shinarump Flats, a sandy area dotted with isolated buttes. The southern third of the SSA consists of gently sloping alluvial fans. Elevations in the SSA range from 4,700 to 6,400 feet above mean sea level (MSL). Streams have eroded deep canyons in many areas.

The most significant feature of the SSA is the Vermilion Cliffs, which traverse east to west through the SSA. The Vermilion Cliffs are the first step in the dramatic "Great Rock Stairway" of the Vermilion, White, Grey, and Pink Cliffs, which continue the dramatic display of the region's geology that begins in the Grand Canyon some 50

miles to the south. One and one-half billion years of the earth's history are displayed in a distance of 100 miles, starting with the oldest (1.5 billion years old) strata, exposed at the bottom of the Grand Canyon, and rising to the Bryce Canyon National Park and the Pink Cliffs, which are less than 65 million years old. Within the last 5 million years, stream erosion has cut deep gorges into the limestone and sandstone to expose colorful strata and create arches and spires. This dramatic scenery draws visitors from around the world (Rife, 1990).

The CGSs are located on a high desert area known as the Shinarump Flats, between the Vermilion Cliffs to the north and the Shinarump Cliffs to the south. The flats are generally covered by Quaternary alluvium and underlain by the Chinle formation from the Triassic period of 200 to 230 million years ago. All CGSs are located on Quaternary alluvium 10 feet or more in depth (Crandall, 1990; Doelling and Davis, 1989).

Paleontological resources are plentiful in the rock strata of the region; petrified wood and bones and tracks of dinosaurs and other reptiles, amphibians, and mammals have been found (ZNHA, 1975). However, all of the CGSs are located on alluvial deposits, making it unlikely that fossil material of significant scientific value would be found (McFadden, 1990).

Western Kane County is in the Intermountain seismic belt, a zone of earthquake activity extending from Arizona northward through Utah and ending in Montana. Numerous earthquakes have occurred in and around the SSA. In 1887, two earthquakes centered north of Kanab cracked walls and knocked bricks from chimneys. Several earthquakes of lesser intensity have occurred in the same vicinity. Severe damage in the Kanab area was caused by a 1902 earthquake centered 67 miles west of the SSA; it caused considerable structural damage and numerous rock slides (Stover *et al.*, 1986). In 1959, an earthquake of Modified Mercalli (MM) intensity IV was centered south of Kanab on the Arizona-Utah border; the epicenter was estimated to be at the site of the City of Kanab Landfill, approximately 750 feet south of CGS-5 and 1,500 feet south of CGS-7 (Doelling and Davis, 1989).

Three active fault zones lie within or near the SSA. The Sevier Fault runs roughly north to south 11 miles west of the SSA and the city of Kanab. Within the SSA are two active fault zones, largely concealed by alluvial deposits. The Kanab Creek Fault Zone parallels U.S. Highway 89A. The Johnson Creek Fault Zone extends approximately 9 miles up Johnson Canyon north of U.S. Highway 89 and south of U.S. Highway 89 into Arizona (Doelling and Davis, 1989; Sargent and Philpott, 1985). Four CGSs are located within the southern extension of the Johnson Canyon Fault Zone (Montgomery, 1979).

Based on historical records and geologic conditions, the CGSs could be subject to severe seismic activity in the future. Primary hazards from seismic activity include ground shaking and surface rupture along the fault trace. Rock falls are the greatest class of secondary hazards. The strongest earthquakes expected in the vicinity would have an MM intensity VI. Ground shaking from an earthquake of that magnitude can cause slight damage to poorly constructed buildings but would not be expected to cause significant damage to a well-built structure such as a GWEN facility (Manitakos, 1989).

Kane and Coconino counties are located in the Kaiparowits Basin and have geological characteristics common to petroleum provinces (Doelling and Davis, 1989). Reports by Government geologists conclude that the sedimentary formations underlying the areas in which the CGSs are located are potentially valuable for oil and gas (BLM, 1983; BLM, 1987). However, no oil or gas has been found in commercial quantities (Doelling and Davis, 1989).

While the area has proven mineral resources, exploration and mining activity is currently minimal. Sand and gravel pits operate intermittently, and ornamental stones of less than gem quality are gathered for the tourist trade. No continuously active mining or quarrying operations occur in Kane County or in the portions of Coconino County in the SSA. Kane County is estimated to contain 29 percent of Utah's coal resources, but coal has not been mined since 1972. Metallic ores have not been shipped since World War II (Doelling and Davis, 1989).



The soils on the CGSs are Neville loam, Mido fine sand, Keeseha sandy loam, and Begay fine sandy loam. These are well-drained soils and the seasonally high water tables are greater than 90 feet below the surface. The soils are slightly to moderately susceptible to erosion, except for the Mido fine sand, which is highly susceptible to erosion. These soils vary from mildly to moderately alkaline, with pH values ranging from 7.4 to 8.4. Although the soils on the CGSs are sandy and loamy, none of the sites is on prime farmland because of the lack of irrigation (Crandall, 1990). None of these soils is hydric (SCS, 1987). The specific soils on each CGS are discussed in Sections 3.2 to 3.7 of this EA.

The SSA is in the Colorado River drainage basin. Johnson Wash flows southwesterly, joining Kanab Creek approximately 12 miles south of Kanab, outside the SSA. Kanab Creek continues southerly approximately 33 miles before joining the Colorado River in the Grand Canyon. Kanab Creek on the western edge and Johnson Wash in the center are the only significant watercourses in the SSA. Most watercourses in the area are intermittent. However, there are some natural seeps and artesian wells. Kanab Creek and Johnson Wash, along with several springs, are the major sources of water (Cordova, 1981). Two CGSs (Little, CGS-3, and BLM/City of Kanab, CGS-5) are located within 300 feet of surface water. The distances from each CGS to the nearest surface water or wetlands are given in Sections 3.2 through 3.7 of this EA.

All of the perennial and intermittent streams of the SSA are subject to flooding. Some winter flooding occurs, but the largest floods result from heavy summer thunderstorms, which produce flash floods that can severely erode streambanks and wash out roads and culverts. Johnson Canyon is known for flash floods; the last major damage occurred in August 1983 (Doelling and Davis, 1989). One CGS (Little, CGS-3) is partially within the 100-year floodplain of Johnson Wash (see Figure 3.1 of this EA). None of the other CGSs is located within a 100-year floodplain (FIA, 1978).

Groundwater is found at varying depths throughout the SSA. Aquifers are found in both the consolidated and unconsolidated rocks of the Kanab Creek basin. Most of the unconsolidated rock aquifers are in stream deposits, including alluvial fans and older stream-channel deposits. Aquifers in these stream-channel deposits include Kanab Creek and Johnson Wash. The aquifer near Johnson Canyon yields as much as 400 gallons per minute. Water quality from this resource varies from fresh to moderately saline. Samples from eight wells in the area had concentrations of dissolved solids that ranged from 67 to 1,150 milligrams per liter (mg/l), with an average of 958 mg/l (Cordova, 1981).

The climate of Kane County is characterized by cold winters and mild summers. January is the coldest month, with an average monthly temperature of 36°F, an average low of 22°F, and an average high of 49°F. July is the warmest month, with an average monthly temperature of 70°F, an average low of 58°F, and an average high of 92°F. Average annual precipitation at Kanab is 14.0 inches. Monthly average rainfall ranges from a low of 0.4 inch in June to a high of 2.0 inches in March. The winter months from October through March average over 1.0 inch per month. Summer thunderstorms result in an average rainfall of 1.1 inch in July and 1.4 inch in August (Doelling and Davis, 1989). The frost-free period begins in early May and continues into October, lasting 163 days on average (NOAA, 1975). The Kanab area averages 10 to 12 inches of snowfall per year (Judd, 1991).

Air quality in Kane County is in attainment of National Primary and Secondary Ambient Air Quality Standards, and these standards have been adopted by the State of Utah (Boyce, 1990). Air quality standards are discussed in Section 3.3.3, pages 3.3-1 to 3.3-7 of the FEIS.

### **3.1.2 Biological Setting**

The SSA is typical of a pinyon-juniper ecosystem with vegetation comprised of small trees, shrubs, grasses, and cacti. Juniper trees mixed with pinyon pine occupy the rockier terrain, giving way to sagebrush and grasses on the plains and terraces. Willows, cottonwoods, sedges, and rushes typical of riparian areas can be found

along the major streams. Various forbs and wildflowers are widely distributed throughout the region (Garrison *et al.*, 1977). Vegetation on the CGSs consists of pinyon, juniper, big sagebrush, galleta grass, broom snakeweed, small cacti, and a variety of grasses. Native plant communities have been disturbed by cattle grazing and largely replaced by big sagebrush (Lunceford, 1990).

Common animals in the region include both game and nongame species such as mule deer, coyotes, black-tailed jackrabbits, cottontail rabbits, and various small rodents. Passerine species associated with the pinyon-juniper ecosystem include the plain titmouse, house finch, northern junco, northern flicker, pinyon jay, and American crow. Examples of raptors commonly found are northern harriers, red-tailed hawks, and sharp-shinned hawks (BLM, 1976). In addition, ferruginous hawks (a federal candidate species) and golden eagles are known to inhabit the SSA. Peregrine falcons (a federal endangered species) have been sighted in the SSA, but there are no aeries in the vicinity of the CGSs (Cosseen, 1990). Most of the SSA lacks sufficient surface water to support waterfowl. However, occasional marshy areas near watercourses support marsh birds including great blue heron, snowy egret, and mallard, green-winged teal, and northern pintail ducks (Lunceford, 1991).

The *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (GPO 1989-236-985/00336) states that an area must meet three criteria to be designated as wetland: hydric soils; hydrophytic vegetation; and wetlands hydrology, which includes a shallow water table and standing water for at least 7 days of the growing season (FICWD, 1989). This manual was used as the basis for wetland determination. Based on field investigations (Ryan, 1990), soils data (Crandall, 1990; SCS, 1987), and discussions with the BLM (Hahn, 1990), none of the CGSs meets the federal criteria for wetlands. CGS-3 is within 300 feet of Johnson Wash, a riparian corridor that may be a wetland. No other CGSs are within 300 feet of wetlands.

The SSA contains no national or state parks, refuges, preserves, or sanctuaries (USFWS, 1986). The nearest preserve is the Grand Canyon Game Preserve, located 0.5 mile southeast of the SSA.

In compliance with Section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531, *et seq.*, at 1536), lists of threatened and endangered species that could occur in the SSA were obtained during informal consultation with the U.S. Fish and Wildlife Service (USFWS) in Arizona and Utah (Appendix C, Spiller, 1990, 1992, 1993, pages C-5, C-18 to C-19, and C-22 of this EA; Appendix C, Johnson, 1990, 1992, pages C-6 to C-7, C-20, and C-21 of this EA; Appendix C, Williams, 1993, page C-23 of this EA). According to the latest lists, six species federally listed as endangered or threatened were identified as possibly occurring in the SSA: the peregrine falcon (*Falco peregrinus*), the Mexican spotted owl (*Strix occidentalis lucida*), the Kanab ambersnail (*Oxyloma haydeni kanabensis*), and three plants: Welsh's milkweed (*Asclepias welshii*), Jones cycladenia (*Cycladenia humilis* var. *jonesii*) (a type of dogbane), and Siler's cactus (*Pediocactus sileri*). In addition, thirteen federal candidate species also potentially occur in the SSA:

#### Vertebrates and Invertebrates

<u>Common name</u>	<u>Latin name</u>
Coral pink sand dune tiger beetle	<i>Cicindela limbata albissima</i>
Ferruginous hawk	<i>Buteo regalis</i>
Spotted bat	<i>Euderma maculatum</i>
Chuckwalla	<i>Sauromalus obesus</i>

#### Plants

Gumbo milk-vetch	<i>Astragalus ampullarius</i>
No common name	<i>Camissonia exilis</i>
No common name	<i>Cryptantha cinerea</i> var. <i>arenicola</i>
Paria iris	<i>Iris pariensis</i>

No common name	<i>Jamesia americana</i> var. <i>zionis</i>
Morton wild buckwheat	<i>Eriogonum mortonianum</i>
Atwood wild buckwheat	<i>Eriogonum thompsonae</i> var. <i>atwoodii</i>
No common name	<i>Penstemon ammophilus</i>
Fickeisen pincushion cactus	<i>Pediocactus peeblesianae</i> var. <i>fickeiseniae</i>

The CGSs are either planted with forage grasses or have native desert shrubs and grasses and are used for grazing; they do not contain habitat suitable to these listed or candidate species (Bonebreak, 1990; Cosseen, 1990; England, 1990, 1993; Lunceford, 1990).

Utah state-listed endangered and threatened animal species are identical to the federal list (Bonebreak, 1990). The State of Utah lists eight rare plant species that may occur within the SSA: two milk-vetches (*Astragalus ampullarius* and *A. striatiflorus*), a member of the carrot family (*Cymopterus minimus*), a cactus (*Pediocactus sileri*), a legume (*Pediomelum epipsilum*), a beard-tongue (*Penstemon ammophilus*), and two scorpion weeds (*Phacelia cephalotes* and *P. indecora*). No records exist of sightings of those plants on or within 1 mile of the CGSs (Tuhy, 1990a).

### 3.1.3 Socio-Cultural Setting

The SSA shows evidence of human occupancy beginning as early as 12,000 years ago. The Paleo-Indian Stage (12,000 to 8,000 years ago) relied on big-game hunting as well as gathering activities for sustenance. The subsequent Archaic Stage (8,000 to 1,600 years ago) demonstrated a more complex economic base. The final stage, the Formative Stage (1,600 to 850 years ago), was marked by rapid technological change. It was during the Formative Stage that the culture known as the Anasazi developed (Hauck, 1990).

The Anasazi, meaning "Ancient Ones" in the Navajo language, developed a culture that included masonry wall construction, clay pottery, and settled agriculture. In their later stages, they built spectacular cliff dwellings at great heights above deeply incised canyons. The Anasazi mysteriously disappeared from the Colorado River area around A.D. 1300 (Ambler, 1987). Following the Anasazi, the region was occupied by Numa or Shoshonean peoples, and eventually by Utes and Paiutes. Navajos primarily stayed east of the Colorado River but raided in the Kanab region during the early historic period (Hauck, 1990).

The first Europeans to explore this region were members of the Spanish Army under Coronado. Led by Lieutenant Cardenas, this army explored the Colorado River area in 1540 (Durham, 1990). Kane County was visited by Europeans 200 years later, when a Franciscan priest, Father Garces, explored portions of the Great Basin between 1767 and 1781. In the early 1800s the area was explored by Jedediah Smith for the Rocky Mountain Fur Company. In 1849, John C. Fremont and his scout, Kit Carson, subsequently explored the area for the U.S. Government (Hauck, 1990).

European settlement of the Great Basin began in 1847, with the Mormon colonization of the Great Salt Lake Valley, led by Brigham Young. Young, looking for sanctuary from religious persecution, had read Fremont's reports and was attracted by the area's isolation. In the early 1850s, Mormons poured into the Utah Territory in great numbers, raising the population from 10,000 to 60,000 in just 5 years (Durham, 1990).

In 1864, the Utah Territorial Legislature established the boundaries for Kane County. In the same year, Fort Kanab, the earliest outpost in the area, was built on the east bank of Kanab Creek (City of Kanab, 1989). The fort was occupied for only 4 years during brief hostilities between the settlers and Navajo and Paiute Indians (Hauck, 1990). Unlike other settlers of the west, the Mormons generally lived in relative peace with the Indians (Durham, 1990). The city of Kanab was founded in 1870 by Jacob Hamblin, Levi Stewart, and other members of the Mormon faith sent to do

missionary work among the Indians (City of Kanab, 1989). The next year, Young dispatched two members of the Mormon congregation, the Johnson brothers, to settle Spring Canyon ranch, about 10 miles to the east of Kanab. The area became known as Johnson Canyon. Travel into Kanab from the northern Mormon settlements originally was via Alton and down through Johnson Canyon over the Old Alton Road (Hauck, 1990). Kanab, practically isolated from the rest of the world, emerged from obscurity in the 1920s, when Hollywood discovered the breathtaking desert scenery and turned Kanab into the movie capital of Utah (Durham, 1990).

As required by the National Historic Preservation Act (16 USC 470, *et seq.*), the Arizona and Utah State Historic Preservation Officers (SHPOs) were consulted to determine the potential for the presence of unidentified historic and archaeological resources that might be affected by the project. Both the Utah and Arizona SHPOs recommended that an archaeological survey be conducted to determine the presence of prehistoric or historic cultural resources at the candidate sites (Appendix C, Dykman, 1990, page C-11 of this EA; Appendix C, Gasser, 1990, page C-9 of this EA).

In October and November 1990, a Phase I (BLM Class III) archaeological survey was conducted, consisting of a literature and records search and an on-site survey of the CGSs. The records search revealed seven previously recorded potentially eligible archaeological sites within 1.5 miles of the CGSs. Two of these sites (42KA1596 and 42KA2345) lie within the power line corridor of the Hamblin site (CGS-8). The other five archaeological sites are not on any CGS or within the utility corridor to any CGS, so they would not lie in the areas of ground disturbance. However, one site (42KA2342) is within 82 feet of the BLM site (CGS-2) and has the potential to be affected by construction activities (Hauck, 1990).

The on-site archaeological survey was conducted by a professional archaeologist qualified in the State of Utah, using transects 10 to 20 meters (33 to 66 feet) wide. The survey revealed one potentially eligible archaeological site (42KA3690) on the eastern boundary of the BLM site (CGS-2). All archaeological sites show evidence of Anasazi occupation and are considered potentially eligible for the National

Register of Historic Places (NRHP) because they may provide information relative to the prehistoric occupants of this region (Hauck, 1990). The Utah SHPO has requested that the exact locations of the archaeological sites not be released to the public to ensure the sites' protection (Dykman, 1991).

For reasons discussed in Section 4.8.1.3, beginning on page 4.8-2 of the FEIS and Section 4.1.3 of this EA, historic properties that occur within 1.5 miles of a CGS are potentially subject to adverse visual impacts from the relay node facility. However, the only property in the SSA that is listed or eligible for listing on the NRHP is the Bowman-Chamberlain House located in the city of Kanab, more than 1.5 miles from any of the CGSs (NRHP, 1989).

The Arizona and Utah SHPOs did not recommend that a historic structures survey be conducted to identify potentially eligible properties. However, a survey was conducted, consisting of a records search of all historic properties within 1.5 miles of the CGSs and a reconnaissance survey of the areas. The reconnaissance survey consisted of driving all accessible roadways within 1.5 miles of the CGSs and examining inaccessible locations through binoculars. The properties were then evaluated for their potential eligibility for the NRHP (Hauck, 1990).

The survey found three resources that are potentially eligible for the NRHP: an historic road (Old Alton Road, 42KA3688) within 1.5 miles of CGS-2, CGS-3, and CGS-4; an historic ranch (Von Haak, 42KA3708) within 1.5 miles of CGS-3 and CGS-4; and another historic ranch (Seeps, 42KA3691) within 1.5 miles of CGS-8. Old Alton Road was the primary wagon route used for travel between Kanab and the northern Mormon settlements via Johnson Canyon from the late 19th century until 1920. It is eligible for the NRHP because it is associated with events that have made a significant contribution to the broad patterns of history (Hauck, 1990).

The Von Haak Ranch consists of a farm complex containing two historic homes and associated corrals and structures. This property was originally developed by Neaf Hamblin who lived in the sandstone and rock house prior to his marriage in 1916; he subsequently built a brick home. The ranch, and particularly the brick house, is



considered potentially eligible for the NRHP. The Seeps Ranch complex consists of a prairie-style brick ranch house dating to around 1920 and associated farm buildings, including a standing barn of vertical plank construction and a standing, circular, wooden silo. Evaluation of these properties determined that setting was not important to their eligibility (Hauck, 1990). They therefore would not be affected by potential visual impacts from construction of a GWEN tower.

In compliance with the American Indian Religious Freedom Act of 1978 (42 USC 1996), the Bureau of Indian Affairs (BIA) was consulted in order to locate tribes associated with the project area (Crosier, 1992). At BIA recommendation, tribal organizations were written representing the Hopi, Havasupai, Paiute, Goshute, Unitah, Ouray, Hualapai, Yavapai-Apache, and Ute tribes, and the Navajo Nation. These tribes were notified, the GWEN project was explained, and information was requested regarding traditional, religious, or sacred sites located within the SSA. Representatives of the Paiute Tribe of Utah, the Kaibab Paiute Tribal Council, and the Navajo Nation responded and expressed no concerns about the GWEN project (Anderson, 1990; Rogers, 1990a; Appendix C, Downer, 1990, page C-16 of this EA). No response has been received from representatives of the Hopi Tribe, Skull Valley Goshute Tribe, Unitah and Ouray Tribes, Hualapai Tribal Council, Ute Mountain Ute Tribe, Southern Ute Tribe, Havasupai Tribal Council, or the Yavapai-Apache Community Council.

Land ownership in Kane County is dominated by government entities. The Federal Government owns 82 percent, and the State of Utah 8 percent, leaving only 10 percent of the land (approximately 261,440 acres) under private ownership. The BLM manages 57 percent of the land in the county for multiple uses such as recreation, mining, and grazing (Doelling and Davis, 1989).

In 1982, there were 209,226 acres in farms, but fewer than 16,000 acres were classified as cropland. Most of the remainder is rangeland, and livestock operations accounted for over 80 percent of the county's total farm revenue of \$1.6 million in 1982 (Census Bureau, 1988). Outside the city limits of Kanab, most private land is zoned Agricultural by Kane County; however, there are also parcels zoned

Residential Agricultural and Residential Estates by Kane County (Heyborne, 1990a, 1992). The zoning designations for each CGS are discussed in Sections 3.2 to 3.7 of this EA.

Ambient noise levels in Kane County are generally low; truck and automobile traffic and light industrial plants are the major noise sources. As described in Section 3.5.3, page 3.5-1 of the FEIS, local ordinances typically set maximum noise level limits at 70 to 75 dBA for land under agricultural use. Kane County does not have a local noise ordinance (Heyborne, 1990b). Kanab City does have a noise ordinance, but the ordinance does not specify a decibel limit and would therefore not affect siting at the CGSs located within city limits (Evans, 1990).

The population of Kane County was estimated to be 5,100 in 1990, an increase of 26 percent since 1980. Kanab, Utah, the only incorporated community in the SSA, had a population of 2,148 in 1980 and had grown to approximately 3,000 by 1988 (Rogers, 1990b). The northeast corner of Fredonia, Arizona, a town of just over 1,000 in 1980 (Rand McNally, 1989), abuts the southwest quadrant of the SSA. In general, the SSA is sparsely populated; however, there are some low-density, rural subdivisions in the vicinity of the four CGSs near Johnson Canyon.

Tourism is the backbone of the local economy. Kanab's central location makes it a popular stopover place for visitors to the national parks in the vicinity, which support employment in retail trade and lodging. Agricultural activity is restricted to cattle grazing and alfalfa hay production. Mineral production is limited to sand and gravel quarries; oil and gas and other mineral resources are not found in economic quantities in the SSA. City, county, and federal government agencies are also important employers (UDCED, 1990).

The sources of income in Kane County reflect its economic base. Retail trade and services provided 22 percent of personal income in 1987, the government sector provided 12 percent, and the farm sector provided only 2.5 percent. Non-wage income from Social Security, other retirement programs, interest, rent, and dividends is a major contributor to local income, accounting for 36 percent of county income in

1987. The 1988 estimated per capita income was \$10,696 in Kane County, compared to \$12,189 in the state (USBEA, 1990). The unemployment rate was 6.9 percent of the civilian labor force of 2,414 in Kane County in 1989; statewide unemployment averaged 4.6 percent (Rogers, 1990b). The economic activity in the Arizona portion of the SSA consists of a few retail establishments along U.S. Highway 89A and scattered cattle ranches that use the desert areas for grazing. Employment in the town of Fredonia, which lies outside the southwest border of the SSA, is mainly in the trade, services, and government sectors.

The transportation system serving the SSA consists of U.S. Highways 89 and 89A. The SSA is not served by rail lines and has no scheduled passenger air service, although charter air service is available at the Kanab Municipal Airport, approximately 2 miles south of Kanab. U.S. Highway 89 links the SSA with Zion and Bryce Canyon National Parks to the north and also traverses the SSA from east to west connecting Kanab with the Glen Canyon Recreational Area and Page, Arizona. The segment of U.S. Highway 89 north of Kanab is designated as a scenic route by the State of Utah (UDT, 1988). U.S. Highway 89A runs south from Kanab and Fredonia and is a major link with Grand Canyon National Park to the south. Johnson Canyon Road, which runs north from U.S. Highway 89 up Johnson Canyon, is designated as a scenic backway by the State of Utah (UTC, 1990).

Recreational resources in the SSA include Kanab City Park, the Coral Cliffs Golf Course, the Kanab Trap Club, and public lands administered by the BLM. The majority of the land in the SSA is owned by the BLM and is potentially available for recreational activities. The Kanab Trap Club is within 1.5 miles of CGS-5 and CGS-7. No other recreational site within the SSA is within 1.5 miles of any CGS (City of Kanab, 1989).

The visual setting is rural in character. The landscape consists of sagebrush-covered rangeland broken by variegated escarpments of sandstone. Except for views of Kanab, Utah, and Fredonia, Arizona, on the western edge of the SSA, the complexity of the skyline is generally low, as defined in Section 4.8.1.3, page 4.8-10 of the FEIS. Pinyon and juniper trees, occasional windmills, and water tanks

combine with electric power poles to provide a vertical contrast to the otherwise level aspect of the plateau region. The dominant visual feature in the SSA is the Vermilion Cliffs escarpment, rising 800 to 1,000 feet above the flats, and running roughly east to west just north of U.S. Highway 89. This escarpment contributes to the scenic vistas that attract visitors to the area. There are several antennas located atop the Vermilion Cliffs near Kanab. As mentioned above, Kanab is a center for tourism in the numerous national and state parks that are within 90 miles. Johnson Canyon Road, a scenic backway, is within the immediate vicinity of four CGSs. Crescent Butte, a distinctive 400-foot mesa, is 0.5 mile east of Johnson Canyon Road.

The BLM evaluated BLM-managed areas within the SSA as a part of its Visual Resource Management Plan. Crescent Butte was assigned to Visual Resource Management (VRM) Class II, which allows minimal changes to the existing character of the landscape. The objective of this class is to retain the existing character of the landscape; activities under this plan may be seen but should not attract the attention of the casual observer.

The areas north and west of the Butte and a small parcel southwest of the Butte which are near CGS-2, CGS-3, CGS-4, and CGS-8 were assigned to VRM Class III. The objective of this class is to partially retain the existing character of the landscape; activities under this plan may attract attention but should not dominate the view of the casual observer (Noel, 1990).

Substantial changes to the natural landscape have occurred south of Crescent Butte. In addition to U.S. Highway 89, the viewscape from Crescent Butte includes a center pivot irrigation system on the Seeps Ranch to the southeast; a large home between Crescent Butte and Johnson Wash, north of U.S. Highway 89; an electrical substation 0.4 mile to the south; a heavy equipment fabrication yard 1.0 mile to the southwest; a subdivision 1.5 miles to the west; and scattered houses along Johnson Canyon Road, 0.5 to 1.0 mile to the west.

BLM lands in the vicinity of the BLM/City of Kanab (CGS-5) and Chamberlain (CGS-7) sites were assigned to VRM Class IV. The objective of this class is to allow for major changes to the landscape. Private lands in the SSA do not fall under BLM jurisdiction regarding visual resources.

### **3.2 Alternative 1: BLM Site (CGS-2)**

The site contains Neville loam, a deep, well-drained soil with little hazard of flooding. Permeability is moderate, and runoff is medium. The soil is mildly to moderately alkaline, with pH values ranging from 7.8 to 8.4. The erosion hazard is slight. Depth to the seasonally high water table is greater than 90 feet. The soil is not designated as prime farmland (Crandall, 1990) and is not hydric (SCS, 1987).

The site is a gently sloping tract of land with 0 to 3 percent slopes. A shallow swale runs from the northeast corner to the southwest corner of the site but generally flattens out before reaching Johnson Wash, which is 0.1 mile west of the site. The 100-year floodplain for Johnson Wash is approximately 0.1 mile to the west of the site. There is no evidence of flooding on the site.

The site is currently being prepared for grazing under a BLM grazing permit. The site is zoned Federal Land--BLM by Kane County (Heyborne, 1992; Slattery, 1990). The sagebrush has been cleared, and the site has been plowed and seeded with forage grasses. Scattered pinyon and juniper remain on the northeast quadrant of the site. Adjacent areas are also used for grazing.

As discussed in Section 3.1.1 of this EA, the site lies within the southern extension of the Johnson Canyon Fault Zone and could be subject to seismic activity of magnitude MM VI. However, it would not be expected to cause significant damage to a well-built structure such as a GWEN facility (Manitakos, 1989).

Although the records search revealed seven previously recorded potentially eligible archaeological sites within 1.5 miles of this CGS, the on-site survey revealed only one potentially eligible archaeological site (42KA3690) on the CGS, along its

eastern boundary, and one previously recorded site (42KA2342) situated 82 feet outside the southeastern corner of the CGS (Hauck, 1990).

The historic structures survey revealed one property potentially eligible for the NRHP within 1.5 miles of this CGS: Old Alton Road (42KA3688), 1.5 miles northwest of the CGS. Setting is not considered important to its eligibility (Hauck, 1990).

The CGS is approximately 500 feet south of U.S. Highway 89 and 0.75 mile east of Johnson Canyon Road, a scenic backway. Crescent Butte is 0.5 mile northeast of the site. The VRM Class for Crescent Butte is II; the VRM Class for the area surrounding the butte is III (Noel, 1990). The nearest town is Kanab, 9.0 miles west on U.S. Highway 89.

### **3.3 Alternative 2: Little Site (CGS-3)**

Soil on the site is Neville loam, as described in Section 3.2 of this EA.

The site is located on a flat alluvial plain (less than 2 percent slope) that drains southerly to a ditch along U.S. Highway 89. The ditch then enters Johnson Wash approximately 0.1 mile east of the southeast corner of the site. The site is 50 feet west of Johnson Wash, portions of which provide riparian habitat and may be a wetland. This CGS is also partially in the 100-year floodplain of Johnson Wash (see Figure 3.1 of this EA). However, there is no evidence of flooding on the site.

The site has been cleared for use as pasture. Vegetation is sparse, consisting of scattered sagebrush and other desert shrubs and grasses. There are also a few scattered pinyon in the northwest corner of the site. The site is zoned Residential Estates by Kane County, but nearby land is zoned for low density residential uses and agricultural activities (Heyborne, 1992; Slattery, 1990).

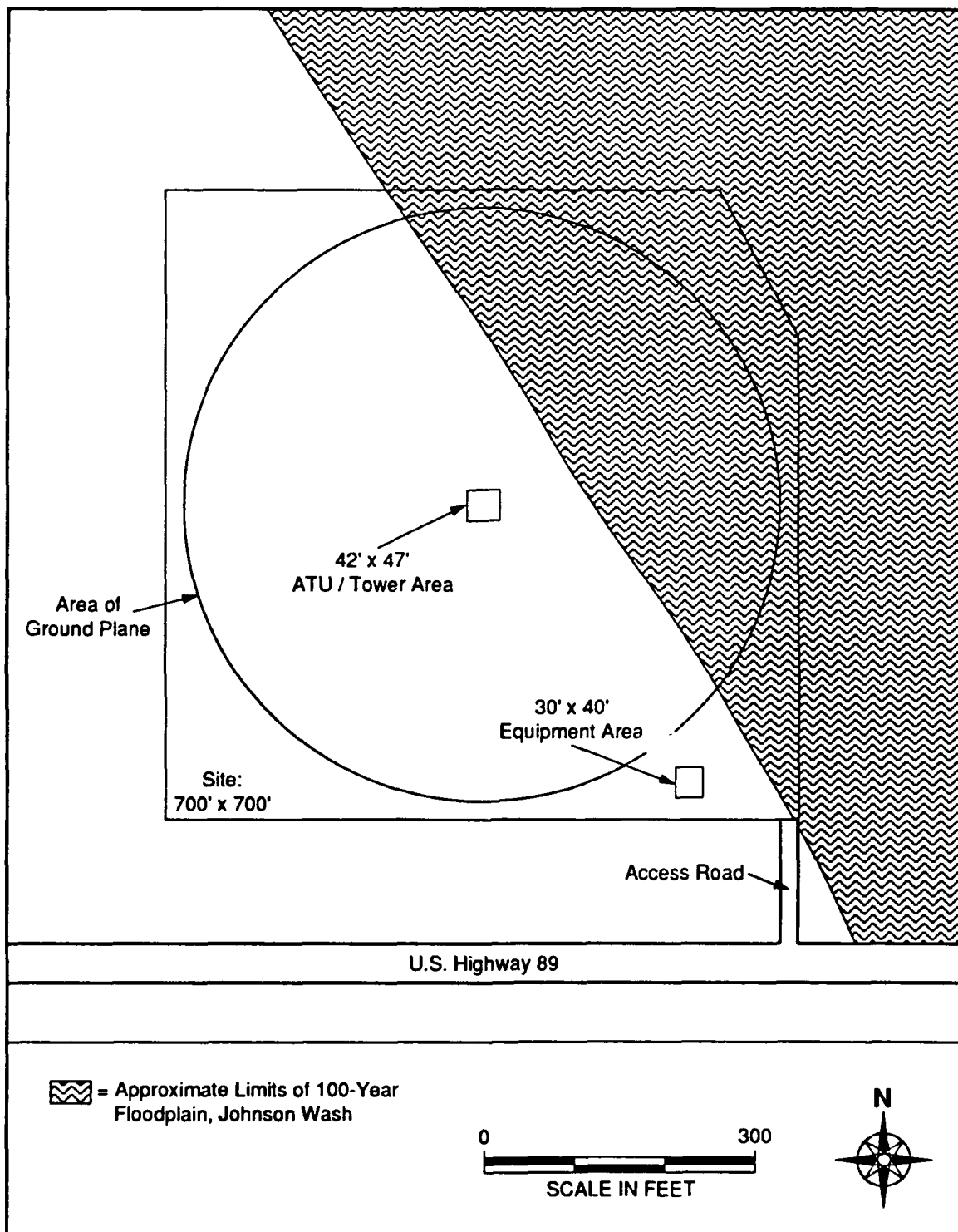


FIGURE 3.1 APPROXIMATE LOCATION OF 100-YEAR FLOODPLAIN AT THE LITTLE SITE (CGS-3)

As discussed in Section 3.1.1 of this EA, the site lies within the southern extension of the Johnson Canyon Fault Zone and could be subject to seismic activity of magnitude MM VI. However, it would not be expected to cause significant damage to a well-built structure such as a GWEN facility (Manitakos, 1989).

The archaeological survey revealed no archaeological resources listed, eligible, or potentially eligible for the NRHP on or within 1.5 miles of this CGS. The historic structures survey revealed two properties potentially eligible for the NRHP within 1.5 miles of this CGS: Old Alton Road (42KA3688), 1.1 miles northwest of the CGS, and the Von Haak Ranch (42KA3708), 1.4 miles north of the CGS. Setting is not considered important to their eligibility (Hauck, 1990).

The CGS is 130 feet north of U.S. Highway 89 and 0.4 mile east of the intersection of U.S. Highway 89 and Johnson Canyon Road, a scenic backway. Crescent Butte is 0.5 mile northeast of the site. The VRM Class for Crescent Butte is II; the VRM Class for the area surrounding the butte is III (Noel, 1990). The nearest town is Kanab, 8.6 miles west on U.S. Highway 89.

### **3.4 Alternative 3: Francis and James Ltd. Site (CGS-4)**

The site contains Mido fine sand, a deep, excessively drained, rapidly permeable soil formed in eolian deposits derived from sandstone. The erosion hazard is high. The soil is mildly to moderately alkaline with pH values ranging from 7.6 to 8.4. Depth to the seasonally high water table is greater than 90 feet. The soil is not designated as prime farmland (Crandall, 1990) and is not hydric (SCS, 1987).

Surface runoff drains southeasterly into a drainage ditch along Johnson Canyon Road. This ditch drains south into another ditch along U.S. Highway 89 and then east to Johnson Wash. The soil absorbs water at a rate of 3 to 4 inches per hour, so there is little runoff (Crandall, 1990). The site is 0.25 mile west of Johnson Wash.



The site is a relatively flat, open field of low sagebrush, cactus, and grasses and is presently used for grazing. The site is zoned Residential Estates by Kane County; adjacent parcels are zoned Commercial and Agricultural (Heyborne, 1992; Slattery, 1990).

As discussed in Section 3.1.1 of this EA, the site lies within the southern extension of the Johnson Canyon Fault Zone and could be subject to seismic activity of magnitude MM VI. However, it would not be expected to cause significant damage to a well-built structure such as a GWEN facility (Manitakos, 1989).

The archaeological survey revealed no archaeological resources listed, eligible, or potentially eligible for the NRHP on or within 1.5 miles of this CGS. The historic structures survey revealed two properties potentially eligible for the NRHP within 1.5 miles of this CGS: Old Alton Road (42KA3688), which is located 160 feet north of the site, and Von Haak Ranch (42KA3708), which is 0.25 mile northeast of the site. Setting is not considered important to their eligibility (Hauck, 1990).

The CGS borders Johnson Canyon Road, a scenic backway. Crescent Butte is 1.0 mile southeast of the site. The VRM Class for Crescent Butte is II; the VRM Class for the area surrounding the butte is III (Noel, 1990). The nearest town is Kanab, 8.3 miles west on U.S. Highway 89.

### **3.5 Alternative 4: BLM/City of Kanab Site (CGS-5)**

The site contains Keeseha sandy loam, a deep well-drained soil formed in eolian deposits over mixed alluvium. It is mildly to moderately alkaline with pH values ranging from 7.4 to 8.4. The erosion hazard is slight to moderate. Depth to the seasonally high water table is greater than 90 feet. The soil absorbs water at 1 to 3 inches per hour, so there is little runoff. The soil is not designated as prime farmland (Crandall, 1990) and is not hydric (SCS, 1987).

The tract slopes gently to the north. Several shallow, dry swales, 1 to 2 feet deep and 2 to 3 feet across, provide drainage into an intermittent creek 0.25 mile north of the site. There is a shallow, seasonal stock pond 130 feet from the eastern boundary of the site. No hydrophytic vegetation was evident near the stock pond during the field investigation, and the available soils data did not indicate the presence of any hydric soils (Crandall, 1990; SCS, 1987). This seasonal stock pond is therefore not considered a jurisdictional wetland.

This site does not lie within a fault zone, although it is near the Kanab Creek Fault Zone. Numerous earthquakes have occurred in and around the SSA, including an earthquake of magnitude MM IV centered south of the CGS at the City of Kanab Landfill in 1959 (Doelling and Davis, 1989). The site could be subject to seismic activity of magnitude MM VI in the future. However, it would not be expected to cause significant damage to a well-built structure such as a GWEN facility (Manitakos, 1989).

This site is located on BLM land that is leased to the city of Kanab and is covered with a mixture of sagebrush and low cactus. The site has been used for grazing in the past and is currently zoned Federal Land--BLM by Kane County. Adjacent areas are also used for grazing (Heyborne, 1992; Slattery, 1990).

The archaeological and historic structures surveys revealed no archaeological or historic resources listed, eligible, or potentially eligible for the NRHP on or within 1.5 miles of this CGS (Hauck, 1990).

The site is located within the city limits of Kanab, 3 miles southeast of the city center. The closest residential development is 1.9 miles west of the site. U.S. Highway 89A is 1.2 miles to the west. The Kanab Trap Club operates a trap and skeet range leased from the city of Kanab. The range is 0.3 mile south of the site. The City of Kanab Landfill is 0.25 mile southeast of the site. The VRM Class for this area around Kanab is IV (Noel, 1990).

### **3.6 Alternative 5: Chamberlain Site (CGS-7)**

Soil on the site is Keeseha sandy loam, as described in Section 3.5 of this EA.

The tract slopes gently to the north and drains into a swale along the western boundary that drains into an intermittent creek 0.1 mile north of the site. The soil absorbs water at 1 to 3 inches per hour, so there is little runoff (Crandall, 1990). There is a shallow, seasonal stock pond 480 feet south of the site.

This site does not lie within a fault zone, although it is near the Kanab Creek Fault Zone. Numerous earthquakes have occurred in and around the SSA, including an earthquake of magnitude MM IV centered south of the CGS at the City of Kanab Landfill in 1959 (Doelling and Davis, 1989). The site could be subject to seismic activity of magnitude MM VI in the future. However, it would not be expected to cause significant damage to a well-built structure such as a GWEN facility (Manitakos, 1989).

The site is covered with a mixture of sagebrush and low cactus and is currently used for grazing. It is zoned Residential Agricultural by Kane County (Heyborne, 1992; Slattery, 1990).

The archaeological and historic structures surveys revealed no archaeological or historic resources listed, eligible, or potentially eligible for the NRHP on or within 1.5 miles of this CGS (Hauck, 1990).

The site is located within the city limits of Kanab, 3.0 miles southeast of the city center. The closest residential development is 1.9 miles west of the site. U.S. Highway 89A is 1.3 miles to the west. The Kanab Trap Club operates a trap and skeet range leased from the city of Kanab. The range is 0.4 mile southwest of the site. The City of Kanab Landfill is 0.3 mile south of the site. The VRM Class for this area around Kanab is IV (Noel, 1990).

### **3.7 Alternative 6: Hamblin Site (CGS-8)**

The site contains Begay fine sandy loam, a deep, well-drained soil with rapid permeability and slow to medium runoff. It is mildly to moderately alkaline, with pH values ranging from 7.4 to 8.4. The erosion hazard is moderate. Depth to the seasonally high water table is greater than 90 feet. The soil is not designated as prime farmland (Crandall, 1990) and is not hydric (SCS, 1987).

The site is a relatively flat tract with an overall slope of about 3 percent. Two shallow swales, approximately 1 foot deep, run north to south but flatten out at the southern edge of the site. Surface runoff drains toward an intermittent creek that flows westerly 0.5 mile south of the site and then percolates into the alluvium. No runoff from the site reaches Johnson Wash, which is 0.6 mile west of the site.

The site is currently grazed. Adjacent areas are also used for grazing. Vegetation is sparse, consisting primarily of sagebrush and other desert shrubs and sparse grasses. The area is zoned Agricultural by Kane County (Heyborne, 1992; Slattery, 1990).

As discussed in Section 3.1.1 of this EA, the site lies within the southern extension of the Johnson Canyon Fault Zone and could be subject to seismic activity of magnitude MM VI. However, it would not be expected to cause significant damage to a well-built structure such as a GWEN facility (Manitakos, 1989).

The records search revealed two archaeological sites that are potentially eligible for the NRHP within the power line corridor of this CGS. Site 42KA1596 is 0.25 mile northwest of the CGS, and 42KA2345 is 0.45 mile northwest of the CGS. The surfaces associated with these sites show signs of previous disturbance (Hauck, 1990).

The historic structures survey revealed one site potentially eligible for the NRHP within 1.5 miles of this CGS: the Seeps Ranch (42KA3691), 1.5 miles southeast of the CGS. Setting is not considered important to its eligibility (Hauck, 1990).

The CGS is located 560 feet south of U.S. Highway 89 along an unnamed road that parallels the highway. The site is 1.4 miles east of Johnson Canyon Road, a scenic backway. Crescent Butte is 0.5 mile north of the site. The VRM Class for Crescent Butte is II; the VRM Class for the area surrounding the butte is III (Noel, 1990). The nearest town is Kanab, 9.9 miles west on U.S. Highway 89.

## **4.0 ENVIRONMENTAL CONSEQUENCES OF ACTION ALTERNATIVES**

This section discusses the potential impacts of the GWEN project on the environmental setting of the six CGSs in southern Utah. Several impacts that would be common to some or all of the action alternatives are discussed in Section 4.1 of this EA. Impacts that are unique to each action alternative are discussed in Sections 4.2 through 4.7 of this EA. As discussed in Sections 4.2, 4.3, and 4.4 of this EA, there would be significant visual impacts at the BLM (CGS-2), Little (CGS-3), and Francis and James Ltd. (CGS-4) sites. There would be no significant impacts at the BLM/City of Kanab (CGS-5), Chamberlain (CGS-7), and Hamblin (CGS-8) sites.

### **4.1 Common Features**

Presented below is information on the physical, biological, and socio-cultural impacts common to some or all of the action alternatives.

#### **4.1.1 Physical**

Impacts from **construction** activities would not be significant. Construction would require localized earth-moving, including excavation and backfilling for placement of foundations and guy-wire anchors. Less than 3,800 square feet would be covered with concrete and gravel for the tower base and the equipment area enclosures. Similar coverage would be required for on-site access roads and parking; incidental activities during construction would disturb a similar amount. In total, about 0.25 acre would be occupied by foundations and the on-site access roads. Construction of the off-site access road and installation of utility lines would have no significant impacts because they would disturb no more than 1.44 acres of land along an existing road on public lands.

The ground plane would be installed using machines that bury wire approximately 1 foot below the surface with minimal disturbance of the soil surface. This process would require moving a small tractor or similar equipment over much of the 11-acre

site, but would not significantly disturb the existing vegetation or create a significant erosion hazard.

The **seismic** risk would be high but not hazardous to people or habitat. As discussed in Section 3.1.1 of this EA, the BLM (CGS-2), Little (CGS-3), Francis and James Ltd. (CGS-4), and Hamblin (CGS-8) sites are within the Johnson Canyon Fault Zone, and the BLM/City of Kanab (CGS-5) and Chamberlain (CGS-7) sites are near the Kanab Creek Fault Zone. All sites could be subject to ground shaking and rupture of the ground surface. However, as discussed in Section 4.1.1.1, page 4.1-1 of the FEIS, shaking from even a very large earthquake would result in only minimal damage to a GWEN facility. In the unlikely event that the tower did collapse, it would remain within the site boundaries and there would be no impact on surrounding areas. Impacts on off-site structures or persons would be negligible. All of the CGSs are sufficiently distant from cliffs and steep slopes to preclude hazards from seismically induced rock falls.

Impacts on **mineral resources** would be minor, as indicated in Section 4.1.1.4, page 4.1-2 of the FEIS. Although the sedimentary formations underlying the CGSs are potentially valuable for oil and gas (BLM, 1983; BLM, 1987), no oil or gas has been found in commercial quantities (Doelling and Davis, 1989). No continuously active mining or quarrying operations occur in Kane County. Although the county contains 29 percent of Utah's coal resources, coal has not been mined since 1972 (Doelling and Davis, 1989). If any resources are present under the CGSs, access to them is unlikely to be restricted, due to the small size of the GWEN site. If access is restricted, development of the site would only deny access to a small portion of those resources for the lifetime of the project and would not result in any significant impacts.

Impacts on **paleontological resources** are not anticipated because fossils are unlikely to occur on any candidate site within the depths affected by installation of footings and guy wire anchors (McFadden, 1990). However, if any fossils are found during construction, work that might affect them would be suspended while the Utah

Geological and Mineral Survey is notified and the significance of the find is evaluated.

**Erosion and increase in storm water runoff** would not be significant. All sites have slopes of 3 percent or less, so any required grading to level the site would be minimal. In addition, standard measures for erosion control would be used during and after site construction. The site's vegetation will be restored to its preexisting natural condition.

The Little site (CGS-3) is within a **100-year floodplain** (FIA, 1978), but there would be no significant impacts, as discussed in Section 4.3 of this EA. None of the other CGSs is within a 100-year floodplain (FIA, 1978).

No **prime farmland** would be removed from production for the project, as none of the sites contains designated prime farmland (Crandall, 1990).

Impacts on **drinking water** are not expected because corrosion of the ground plane is not anticipated to raise copper concentrations in any aquifer or surface water body by more than 20 micrograms per liter ( $\mu\text{g/l}$ ) as discussed in Sections 3.2.4.1 and 4.2.1.1, pages 3.2-2 and 4.2-3 of the FEIS. This represents 2 percent of the maximum allowable copper concentrations permitted by the State of Utah for raw water sources for potable water supply (Utah Drinking Water Rules, Utah Administrative Code Rule 449, Environmental Health, Drinking Water, and Sanitation, as amended through January 1, 1991).

Impacts on **surface water or wetlands** that support aquatic plants and animals would not be significant. Potential impacts could occur when a site is less than 300 feet from surface water or wetlands, if the soil is acidic, or the depth of the seasonally high water table is less than 3 feet from the ground plane (4 feet from the surface). The CGSs in southern Utah have alkaline soils and the depth to the seasonally high water table is 90 feet below the surface. Under these conditions, even though two of the CGSs (CGS-3 and CGS-5) have surface water within 300 feet, the potential for transport of copper away from the immediate area of the ground plane and into



surface water or groundwater would be negligible, as discussed in Section 4.2.1.1, page 4.2-3 of the FEIS.

Impacts on **air quality** would not be significant. Temporary but insignificant increases in air pollutant emissions, including fugitive dust, would occur during construction, primarily from greater use of heavy machinery than would be required in normal farming operations. During operation of the BUPG at 100 percent load, total yearly emissions from the BUPG would be less than 350 pounds per pollutant, as described in Section 2.1.2 of this EA. These are well below the standards set by the State of Utah (Utah Air Conservation Regulations, as revised), which requires permits for facilities emitting any single regulated substance at the rate of 1 ton per year. Hence, the project would not result in violation of Primary and Secondary Ambient Air Quality Standards. Permits will not be required under Utah Air Conservation Regulations (Seeby, 1990).

#### **4.1.2 Biological**

Impacts on **wildlife and wildlife habitats** would not be significant. The habitats affected are locally abundant, and none is unique. Historically, cattle grazing has been the most common use on each CGS; consequently, vegetation on the CGSs has been altered by the foraging cattle and, in some cases, by brush-clearing and reseeding of forage grasses (Lunceford, 1990). No CGS is located on a wetland and only one site (CGS-3) has wetlands within 300 feet, as discussed in Section 3.1.2 of this EA. Although CGS-3 is within 50 feet of Johnson Wash, portions of whose banks are lined with riparian habitat, there would be no impact to this habitat, as described in Section 4.3 of this EA. No critical or exceptionally valuable wildlife habitats would be at risk or would be close enough to attract waterfowl or other wildlife to the tower's vicinity.

**Bird collisions** with the tower may occur but are not expected to be significant. Section 4.4.1.5, page 4.4-5 of the FEIS states that the majority of bird collisions occur in adverse weather conditions when the visibility of man-made structures is obscured and birds may be forced to lower their flight level. Generally, songbirds

(passerines) are more likely to collide with a tower or the guy wires than are raptors or waterbirds (Avery *et al.*, 1980). Areas with high concentrations of bird flight activity, such as feeding and nesting habitats, prominent topographical features that could serve as navigational aids, known migration corridors, and raptor roosting areas, were avoided during site selection. The Utah Division of Wildlife Resources has suggested that any overhead power lines associated with the GWEN project should be constructed in a manner that minimizes threats of electrocution hazards to raptors (Cosseen, 1990). Installation and upgrading of the GWEN power lines in southern Utah will be done in accordance with the guidelines provided by the Raptor Research Foundation, Inc. (Olendorff *et al.*, 1981); wires will be insulated and artificial perches will be constructed above transformers to provide higher and safer places for birds to perch.

No federally listed **threatened or endangered species** would be affected. This determination was made after informal consultation with the USFWS in compliance with Section 7 of the Endangered Species Act of 1973 as amended (16 USC 1531, *et seq.*, at 1536). As discussed in Section 3.1.2 of this EA, the CGSs are located primarily on grazing land and do not provide habitat for any of the 6 listed or 13 candidate plant and animal species. In 1990, the Utah office of the USFWS concurred in writing that none of the listed or candidate species listed at that time would be affected by the GWEN project (Appendix C, Johnson, 1990, page C-8 of this EA). Since that time, the Arizona office of the USFWS indicated that four additional candidate species could occur in the vicinity of the GWEN sites: the Fickeisen pincushion cactus, the chuckwalla, the Morton wild buckwheat, and the Atwood wild buckwheat. However, all the sites are located in Utah and consultation with the USFWS office in Salt Lake City (England, 1993) established that the nearest known location of the Fickeisen pincushion cactus to the GWEN sites is 15 to 20 miles south of the CGSs and is unlikely to be located on the CGSs; the office also indicated that it was unlikely for either of the wild buckwheats to be located near the CGSs. The chuckwalla could be in the general vicinity of the CGSs, but this lizard requires talus slopes or rocky outcrops in desert areas (Jaeger, 1961; Ransom, 1981), and this habitat does not exist on the loamy soils and grazing land of the CGSs. Therefore, no impacts on these four candidate species are anticipated. In

addition, no state-listed threatened, endangered, or rare plant or animal species are known to occur on or adjacent to any of the sites (Bonebreak and Jensen, 1990; Cosseen, 1990; Tuhy, 1990b).

#### **4.1.3 Socio-Cultural**

**Local employment** would be increased slightly, primarily through use of local subcontractors for earth-moving and possibly for some of the facility's maintenance.

Impacts on **community support systems** would not be significant because the relay node will be unmanned and will use modest amounts of power, comparable to that used by an average single-family house. Security needs will be met through agreements with local police officials to monitor the integrity of the site during routine patrols, as detailed in Section 4.6.1.1, page 4.6-1 of the FEIS.

Impacts on **land use** would not be significant. CGS-2 and CGS-5 are zoned Federal Land--BLM; CGS-3 and CGS-4 are zoned Residential Estates; CGS-7 is zoned Residential Agricultural; and CGS-8 is zoned Agricultural. There are no local restrictions concerning development of the proposed GWEN facility. A GWEN facility is permissible under a "special use" variance of a BLM right-of-way agreement. Care was taken in the site selection process to maintain setbacks from institutional uses such as schools, churches, recreational areas, and residential developments. The tower would not significantly affect property values because non-noxious, nonresidential land uses, such as the proposed relay node, have no systematic effect on housing values, as stated in Section 4.7.1.3, beginning on page 4.7-8 of the FEIS.

**Construction noise** impacts would be temporary and insignificant. Operational noise from the back-up generator would be less than 72 dBA at the site boundary. At 50 feet beyond the site boundary the noise level would drop below 65 dBA, as discussed in Section 2.1.2 of this EA. Although Kane County has no noise ordinances, this noise level is within the standards typically set for residential and mixed residential/agricultural use (55 to 65 dBA), as stated in Section 3.5.3, page

3.5-2 of the FEIS. In addition, the BUPG would only operate at this noise level for 2 hours per week during testing and during commercial power outages. The Kanab City noise ordinance does not specify a decibel limit (Evans, 1990) and would therefore not affect siting at the BLM/City of Kanab (CGS-5) or Chamberlain (CGS-7) site. In addition, no residence is within 50 feet of any site boundary.

Impacts on **public health and safety** would not be significant, as discussed in Sections 4.11 and 4.12, beginning on pages 4.11-1 and 4.12-1, respectively, of the FEIS. Shock and burn risks would be associated with the buildup of electrical charges on ungrounded metallic objects inside the inner exclusionary (8-foot) fence located approximately 20 feet from the tower base. However, a grounded person within the outer exclusionary (4-foot) fence located approximately 330 feet from the tower base who touches an ungrounded object while the tower was transmitting would experience only a mild shock, sufficient to cause the individual to break contact but not cause harm. Furthermore, because the transmission periods would total between 6 and 8 seconds per hour during normal operations, the risk of even these mild shocks would be insignificant. Only a determined effort to enter the inner exclusionary zones, within the 8-foot fence, would put a person at increased risk of higher shock and a higher specific absorption rate, dependent on the period of prolonged grasping contact with an ungrounded metallic object. Fire hazards at the relay node facility would be low, as discussed in Section 4.12.1.1, page 4.12-1 of the FEIS. Radio-frequency emissions would not cause adverse health effects, as discussed in Section 4.4.1.6, pages 4.4-6 and 4.4-7 of the FEIS. Subsequent to the publication of the FEIS, further study confirmed the conclusion of the FEIS that there is no evidence of adverse effects of GWEN radio-frequency emissions on public health (NRC, 1992).

The relay node would operate in the LF band and therefore would not interfere with pacemakers, emergency communications, commercial and amateur radios, televisions, or garage door openers, as noted in Section 2.1.1.1, page 2-3 of the FEIS.

Impacts on **archaeological resources** would not be significant. Four potentially eligible archaeological resources (42KA1596, 42KA2345, 42KA2342, and 42KA3690) were identified during the archaeological survey as being on or near two of the CGSs. One was located on the edge of the BLM site (CGS-2), one was 82 feet from the BLM site (CGS-2), and two were within the power line corridor of the Hamblin site (CGS-8). These archaeological sites would be avoided during construction, as discussed in Sections 4.2 and 4.7 of this EA. The on-site survey revealed that no significant archaeological resources were located at the Little (CGS-3), Francis and James Ltd. (CGS-4), BLM/City of Kanab (CGS-5), and Chamberlain (CGS-7) sites (Hauck, 1990). If any archaeological resources are found during construction, work that might affect them will be suspended while the Utah SHPO and the Office of the State Archaeologist are notified in accordance with the provisions of 16 USC 470, *et seq.*, at 470f. The Utah and Arizona SHPOs and the BLM concur that no archaeological resources would be affected by the GWEN project (Appendix C, Dykman, 1991, pages C-12 through C-15 of this EA; Appendix C, Gasser, 1991, page C-10 of this EA; Appendix C, Smith, 1991, page C-17 of this EA).

Impacts on **historic properties** would not be significant. There are no properties listed or eligible for the NRHP within 1.5 miles of any CGS (NRHP, 1989). The records search and reconnaissance survey found no potentially eligible properties where setting was important to their eligibility (Hauck, 1990). Therefore, no property would be affected by potential visual impacts from a GWEN tower. The Utah SHPO concurs with this determination (Appendix C, Dykman, 1991, page C-12 of this EA).

Significant impacts to **Native American traditional, religious, or sacred sites** are not anticipated. At BIA recommendation (Crosier, 1992), tribal organizations were written representing the Hopi, Havasupai, Paiute, Goshute, Unitah, Ouray, Hualapai, Yavapai-Apache, and Ute tribes, and the Navajo Nation. These tribes were notified, the GWEN project was explained, and information was requested regarding traditional, religious, or sacred sites located within the SSA. Representatives of the Paiute Tribe of Utah, the Kaibab Paiute Tribal Council, and the Navajo Nation responded and expressed no concerns about the GWEN project

(Anderson, 1990; Rogers, 1990a; Appendix C, Downer, 1990, page C-16 of this EA). No response has been received from representatives of the Hopi Tribe, Skull Valley Goshute Tribe, Uintah and Ouray Tribes, Hualapai Tribal Council, Ute Mountain Ute Tribe, Southern Ute Tribe, Havasupai Tribal Council, or the Yavapai-Apache Community Council.

**Visual** impacts associated with a GWEN tower are discussed in Sections 3.8 and 4.8, pages 3.8-1 and 4.8-1, respectively, of the FEIS. The significance of a visual impact would depend on the visual dominance of the GWEN facility and the sensitivity of the affected views. Visual dominance is the degree to which a GWEN facility would compete with other features of the existing landscape for the attention of the viewer. Section 3.8.4, beginning on page 3.8-3 of the FEIS defines four levels of dominance, called Visual Modification Classes (VMC):

- VMC 1, not noticeable: the tower would be overlooked by all but the most interested viewers
- VMC 2, noticeable, visually subordinate: the tower would be noticeable to most viewers without being pointed out but would not compete with other features for their attention
- VMC 3, distracting, visually codominant: the tower would compete with other features in the landscape for the viewer's attention
- VMC 4, visually dominant, demands attention: the tower would be the focus of attention and tend to dominate the view.

Visual sensitivity is a measure of the public's reaction to a proposed change of the affected view and is a function of the viewer's activity, awareness, goals, and values. Consequently, the more sensitive the view, the stronger will be the public reaction to any alteration of it. Areas defined in the FEIS as having high visual sensitivity include national and state parks; designated scenic routes; designated national, state, or

local historic sites where setting is important to their historic significance; and travel routes providing primary access to these sites. Examples of areas having medium visual sensitivity would be locally popular, but undesignated, beaches or public use areas and the travel routes that provide primary access to them. Travel routes that pass near or provide access to high sensitivity views, such as historic properties, but primarily serve other destinations are considered medium sensitivity. Travel routes are considered sensitive on segments within 0.5 mile of the property and 1.5 miles of the tower, based on FEIS criteria and review by visual analysis specialists (Duffey, 1991). Low visual sensitivity includes those views from sites, areas, travel routes, and sections of travel routes not identified as medium and high in sensitivity. Trap and skeet ranges, which are a type of recreational facility (normally considered high sensitivity), are considered low sensitivity because they are used for loud, rapid-fire, mechanical activities in which the attention of the participants is focused on the activity itself rather than on the surrounding environment.

In the BLM visual management system, a rating of VRM Class II is approximately equivalent to a high sensitivity area according to the FEIS criteria. Crescent Butte is VRM Class II. The visual analysis in this EA for Crescent Butte has been conducted from two points of view: the view as viewers look towards the butte and the view as they stand on the butte looking away to the surrounding areas.

According to FEIS criteria, significant visual impacts would occur if the relay node facility were to dominate or codominate (VMC 4 or 3) a high-sensitivity view or dominate (VMC 4) a medium-sensitivity view. If the relay node facility cannot be seen from medium-to-high sensitivity routes or areas, then visual impacts are not considered significant. Distance is the primary factor in determining visual dominance and therefore visual impacts. At distances greater than 3 miles, a GWEN tower would not be visible to the unaided eye. At 1.5 to 3 miles, the tower would be visually subordinate if noticeable (VMC 2) but more usually would not be noticed (VMC 1) because of its grey color and lack of mass. If a viewer at this distance actively sought the tower, it would appear as a thin vertical line on the horizon. Within 1.5 miles, the tower becomes a more important component of the view. In addition, other aspects of the tower's setting, such as focal point sensitivity, skyline complexity,

competing feature interest, and topographic and vegetative screening, become important considerations in determining the level of visual impact.

USGS topographic maps and a windshield survey were used to determine whether any high or medium sensitivity views were within 1.5 miles of a CGS. The visual impacts associated with each site are discussed in Sections 4.2 to 4.7 of this EA.

#### **4.2 Alternative 1: BLM Site (CGS-2)**

Significant impacts are expected.

**Visual** impacts would be significant. Johnson Canyon Road, a scenic backway, running north/south just west of the CGS, comes within 0.75 mile of the proposed tower and is a high sensitivity view. The tower would be visible from Johnson Canyon Road for a distance of approximately 1.3 miles as one travels south toward U.S. Highway 89. The closest distance to the CGS is 0.75 mile at the intersection of Johnson Canyon Road and U.S. Highway 89. Looking east from this point on the highway, the view to the tower would be unobstructed by intervening topography or vegetation, and the complexity of the skyline is low. Although an electrical substation 400 feet north of the CGS provides some competing feature interest, the GWEN tower would be distracting and visually co-dominant (VMC 3), resulting in a significant visual impact.

Crescent Butte, a high sensitivity view according to the BLM visual management system, is northeast of the CGS and ranges in distance from 0.5 to 1.0 mile (east/west) from the CGS. There would be no significant visual impacts either looking north towards the butte from U.S. Highway 89 or looking south from the butte towards the CGS. The most common viewing point of the butte is from U.S. Highway 89, which comes within 500 feet of the CGS. A viewer at that point looking north to the butte would not see the tower, because the tower would be behind the viewer on the opposite side of the highway from the butte. Driving west, at approximately 0.5 mile east from the CGS along U.S. Highway 89, the butte and the tower would be in the same field of view, based on an assumption of a 130-degree viewing angle, as



discussed in Section 4.1.8.3, page 4.8-2 of the FEIS. However, there is strong competing feature interest provided by man-made features on the same side of the highway as the CGS. There is an electrical substation adjacent to the south side of the road, 400 feet from the CGS, and farther west on the same side of the highway there is a heavy equipment fabrication yard, along with some scattered houses. Therefore, although the general complexity of the landscape is low and there is no intervening topography or vegetation, the tower would be noticeable but visually subordinate (VMC 2). Approximately 0.5 mile west along the highway, a similar situation occurs. When looking east, the viewer would see the substation near the CGS on the same side of the road. For this reason, the tower would still be VMC 2.

When viewed from the butte, the tower would be noticeable but visually subordinate (VMC 2) to man-made features, including the Seeps Ranch center pivot irrigation system to the south, the heavy equipment fabrication yard and scattered homes to the southwest, the electrical substation to the south, and U.S. Highway 89 itself. Therefore, construction of the tower on the site would not have a significant impact on the view from the butte.

Impacts on **archaeological resources** would not be significant. The on-site survey revealed a potentially eligible archaeological site just within the CGS's eastern boundary (42KA3690) (Hauck, 1990). The records search identified another potentially eligible archaeological site (42KA2342) 82 feet from the southeast corner of the site. Neither of these archaeological sites is in the area of disturbance of the ground plane or the perimeter fence. However, an archaeologist would be present to monitor construction activities to ensure that tower construction would not disturb any archaeological remains. The Utah SHPO concurs that there would be no impact to this site (Appendix C, Dykman, 1991, pages C-12 through C-15 of this EA).

#### **4.3 Alternative 2: Little Site (CGS-3)**

Significant impacts are expected.

**Visual** impacts would be significant. Johnson Canyon Road, a scenic backway running north/south just west of the CGS, comes within 0.45 mile of the proposed tower and is a high sensitivity view. The tower would be visible from Johnson Canyon Road for a distance of approximately 1.5 miles as one travels south toward U.S. Highway 89. The closest point is 0.45 mile west of the CGS at the intersection of Johnson Canyon Road and U.S. Highway 89. Looking east from the highway, the view of the tower would be unobstructed by intervening topography or vegetation, and the complexity of the skyline is low. Although there is an electrical substation 0.5 mile beyond the tower, this would not provide significant competing feature interest. The GWEN tower would be visually dominant (VMC 4), resulting in a significant visual impact.

In addition, the site is within 0.5 mile of Crescent Butte, a high sensitivity view according to the BLM visual management system. Views of the butte would be significantly impacted by the presence of a GWEN tower on the CGS. The most common viewing point of the butte would be looking north from U.S. Highway 89, which is south of the CGS and comes within 130 feet of the CGS. At the highway's closest point, the tower would come between the viewer and the butte. The skyline complexity is low, and there is no intervening topography or vegetation, no focal point sensitivity, and no substantial competing feature interest. The tower would therefore be dominant (VMC 4) and would have a significant impact on the view of the butte and conflict with established BLM visual management objectives.

When viewed from the butte, the tower would be noticeable but visually subordinate (VMC 2) to all of the other man-made features visible from the butte, including the Seeps Ranch center pivot irrigation system to the south, the heavy equipment fabrication yard and scattered houses to the southwest, the electrical substation to the south, and U.S. Highway 89 itself. Therefore, construction of the tower on the site would not have a significant impact on views from the butte.

There would be no significant impacts at the Little site (CGS-3) from its siting within a **100-year floodplain** (FIA, 1978). If this site were selected, the tower, access road, and equipment enclosures would be located above the 100-year floodplain (see

Figure 3.1, page 3-18 of this EA). Existing grades and the integrity of the drainage would be maintained. Therefore, impacts from erosion, sedimentation, and surface runoff would not be significant.

Impacts on **surface water and wetlands** would not be significant. Although this CGS is within 50 feet of Johnson Wash, portions of which provide riparian habitat and may be wetlands, the soils on the CGS are alkaline and the depth to the seasonally high water table is greater than 90 feet. Under these conditions, the potential for transport of copper away from the immediate area of the ground plane and into surface water would be negligible, as discussed in Section 4.2.1.1, page 4.2-3 of the FEIS.

#### **4.4 Alternative 3: Francis and James Ltd. Site (CGS-4)**

Significant impacts are expected.

**Visual** impacts would be significant. Johnson Canyon Road, a scenic backway running north/south just east of the CGS, comes within 400 feet of the proposed tower and is a high sensitivity view. The tower would be visible to travellers on portions of Johnson Canyon Road: for 0.75 mile going north from U.S. Highway 89 to the tower, and for 0.5 mile going south from a point 0.5 mile north of the tower. The closest point is as the road approaches the site 400 feet to the east. At that point the view west toward the tower would be unobstructed by intervening topography or vegetation, there is no competing feature interest or focal point sensitivity, and the complexity of the skyline is low, although the Vermilion Cliffs provide a backdrop to the tower, rising 850 feet above the elevation of the tower base. The GWEN tower would be visually dominant (VMC 4), resulting in a significant visual impact.

Crescent Butte, a high sensitivity view according to the BLM visual management system, is a minimum of 1 mile southeast of the site. The most common viewing point of the butte would be from U.S. Highway 89 looking north. The point on U.S. Highway 89 where the tower and the butte would be in the same field of view is 0.5 mile west of the intersection of U.S. Highway 89 and Johnson Canyon Road,

approximately 1 mile south of the CGS. From this point on U.S. Highway 89 looking northeast, the skyline complexity is generally low, but the tower would be seen against a portion of the Vermilion Cliffs rising 500 feet above the base of the tower, approximately 0.8 mile away. Only the top 20 feet or so of the tower would be seen above the horizon. In addition, some man-made features within a 130-degree angle of view, including power poles and lines along U.S. Highway 89, scattered houses, and the highway itself, would provide competing feature interest with the tower. Therefore, although there is no intervening topography or vegetation, the tower would be noticeable but visually subordinate (VMC 2) and would not have a significant impact on the view of the butte.

When viewed from the butte, 1 mile southeast of the CGS, the tower would be noticeable but visually subordinate (VMC 2) to the man-made features that would also be visible from the butte, including the Seeps Ranch irrigation system and electrical substation to the south, scattered houses and trailers both to the southwest and along Johnson Canyon Road, the heavy equipment fabrication yard to the southwest, and U.S. Highway 89 itself. Skyline complexity west of the CGS is generally low, although a portion of the Vermilion Cliffs, approximately 1 mile away, rise 850 feet above the elevation of the tower base. The 300-foot GWEN tower would not appear above the horizon, as it would be viewed against the Vermilion Cliffs from the top of Crescent Butte, 250 to 430 feet above the elevation of the tower base. Therefore, construction of the tower on the site would not have a significant impact on views from the butte.

#### **4.5 Alternative 4: BLM/City of Kanab Site (CGS-5)**

No significant impacts are expected.

Impacts on **surface water and wetlands** would not be significant. Although the CGS is 130 feet from a shallow, seasonal stock pond, the soils on the CGS are alkaline and the depth to the seasonally high water table is greater than 90 feet. Under these conditions, the potential for transport of copper away from the

immediate area of the ground plane and into surface water would be negligible, as discussed in Section 4.2.1.1, page 4.2-3 of the FEIS.

**Visual** impacts would not be significant because there are no high or medium sensitivity views within 1.5 miles of the CGS.

#### **4.6 Alternative 5: Chamberlain Site (CGS-7)**

No significant impacts are expected.

**Visual** impacts would not be significant because there are no high or medium sensitivity views within 1.5 miles of the CGS.

#### **4.7 Alternative 6: Hamblin Site (CGS-8)**

No significant impacts are expected.

Impacts on **archaeological resources** would not be significant. Although two archaeological sites that are potentially eligible for the NRHP (42KA1596 and 42KA2345) are located within the power line corridor of the CGS, potential impacts would be avoided by using existing power poles. If any new poles are required, they would be placed to avoid the archaeological sites. The Utah SHPO concurs that there would be no significant impacts to archaeological resources at this site (Appendix C, Dykman, 1991, pages C-14 and C-15 of this EA).

**Visual** impacts would not be significant. Johnson Canyon Road, a scenic backway that is a high sensitivity view, is 1.4 miles west of the proposed tower site at its closest point, at the intersection of Johnson Canyon Road and U.S. Highway 89. At that point, if the viewer is oriented in the direction of travel going south on Johnson Canyon Road, the tower is outside of the normal field of view of 130 degrees. The tower would be in the normal field of view at 0.4 mile north of the intersection, which is 1.5 miles from the tower. From that distance the tower would be visible but would appear as a thin grey vertical line. There is no intervening topography or vegetation.

The complexity of the skyline is generally low, although Crescent Butte to the north of the tower site rises 250 to 430 feet above the elevation of the tower base. Other man-made features in the area would be in the field of view providing some competing feature interest: the electrical substation to the east and the heavy equipment fabrication yard to the west, scattered houses, and power poles and lines along U.S. Highway 89. For these reasons, the tower would be not noticeable (VMC 1) to viewers going south on Johnson Canyon Road. To viewers going north on Johnson Canyon Road, the tower would be behind the viewer and, therefore, would not be directly visible.

Crescent Butte, a high sensitivity view according to the BLM visual management system, is 0.5 mile north of the CGS. There would be no significant visual impacts either looking north towards the butte from U.S. Highway 89 or looking south from the butte towards the CGS. The most common viewing point of the butte is from U.S. Highway 89, which comes within 560 feet of the CGS. A viewer at that point looking north to the butte would not see the tower, because the tower would be on the opposite side of the highway from the butte. To travellers approaching the tower from the east, the butte and the tower would be in the same field of view from 1.5 miles east to 500 feet east of the CGS, based on a 130-degree viewing angle. To a traveller approaching the CGS, there is competing feature interest provided by the Seeps Ranch center pivot irrigation system south of U.S. Highway 89, power poles and lines along U.S. Highway 89, and the highway itself. Therefore, although the general complexity of the landscape is low and there is no intervening topography or vegetation, the tower would be noticeable but visually subordinate (VMC 2). To travellers approaching the tower from the west, the butte and the tower would be in the same field of view from 1.5 miles west to 0.3 mile west of the CGS. Other man-made features would also be visible, including scattered houses, an electrical substation south of the highway, power poles and lines along U.S. Highway 89, and the highway itself. For this reason, the tower would still be VMC 2.

When viewed from the butte, 0.5 mile north of the CGS, the tower would be noticeable but visually subordinate (VMC 2) to the man-made features near the tower, including the Seeps Ranch irrigation system and electrical substation to the

south, the heavy equipment fabrication yard to the southwest, scattered houses and trailers to the southwest, and U.S. Highway 89 itself. Therefore, construction of the tower on the site would not have a significant impact on views from the butte.

#### **4.8 No Action Alternative**

No environmental impact would result from adoption of the no action alternative.

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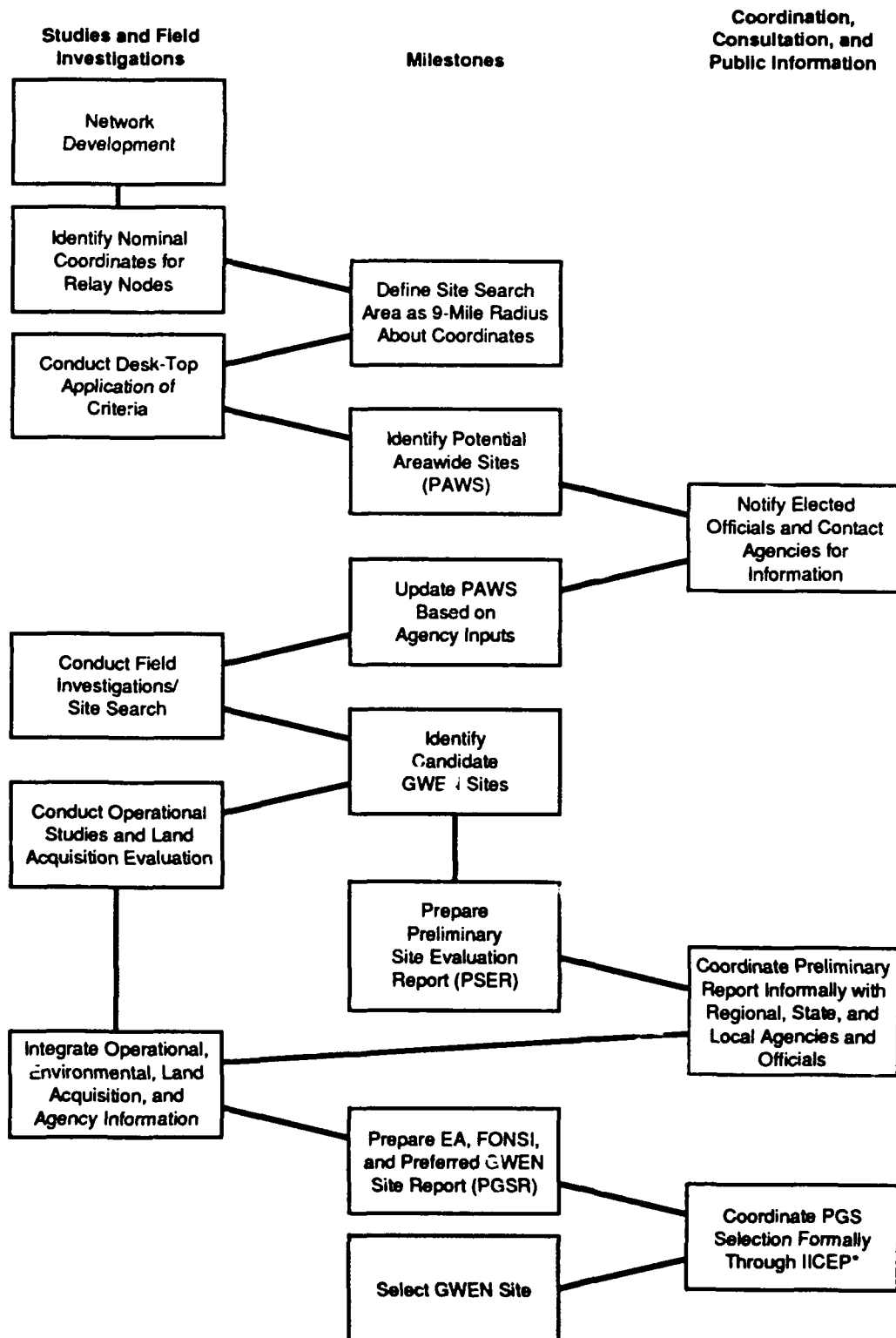
**APPENDIX A**

**SITE SELECTION PROCESS**



## **SITE SELECTION PROCESS**

Figure A.1 of this EA shows the sequence of events during the selection of individual GWEN sites. Figure A.2 of this EA describes the screening process used during the field investigation to choose the candidate GWEN sites (CGSs). The environmental siting criteria applied in the site selection process are defined in Tables 5-1 and 5-2, pages 5-7 through 5-14 of the FEIS.



\*IICEP = Interagency/Intergovernmental Coordination for Environmental Planning.

FIGURE A.1 GROUND WAVE EMERGENCY NETWORK SITE SELECTION PROCESS

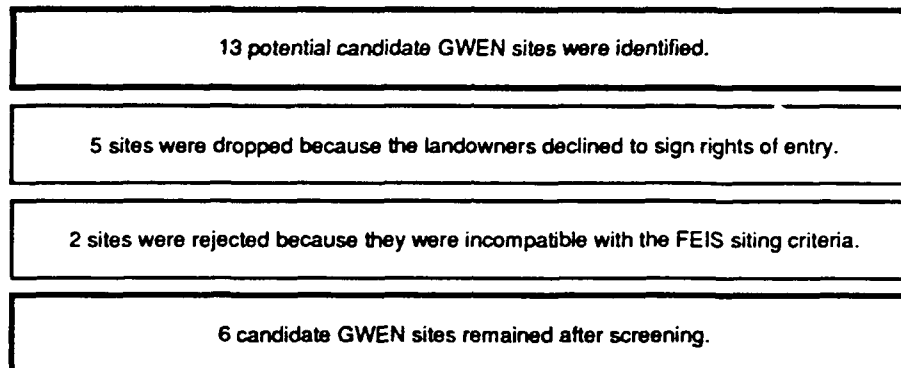


FIGURE A.2 RESULTS OF USING FEIS SITING CRITERIA TO  
SCREEN POTENTIAL CANDIDATE GWEN SITES  
IN THE SOUTHERN UTAH SITE SEARCH AREA

**APPENDIX B**

**TOPOGRAPHIC SETTINGS OF CANDIDATE GWEN SITES**

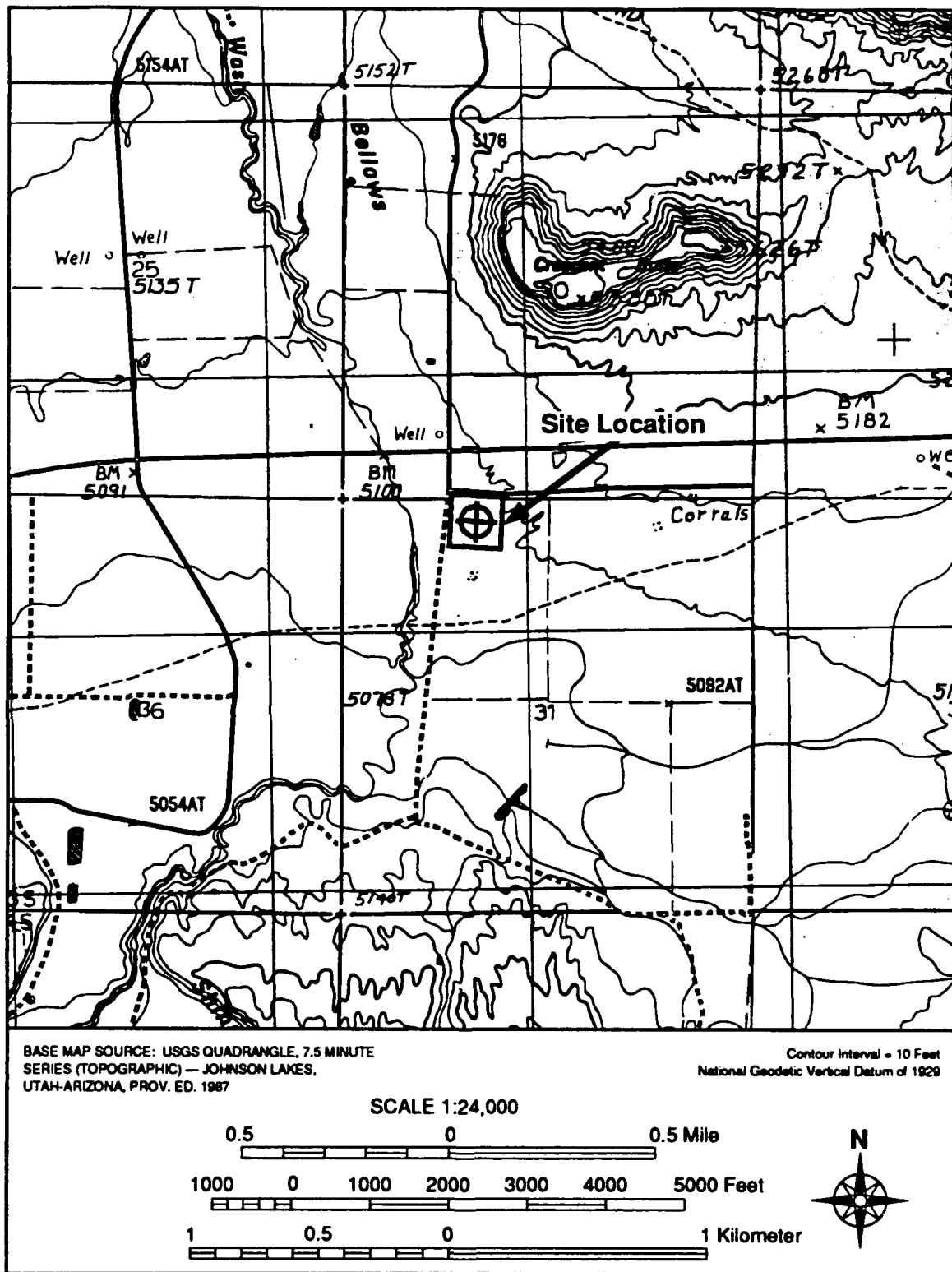


FIGURE B.1 TOPOGRAPHIC SETTING OF THE BLM SITE (CGS-2)

COPY AVAILABLE TO BLM DOES NOT INCLUDE FULLY INFORMED COMMENTARY



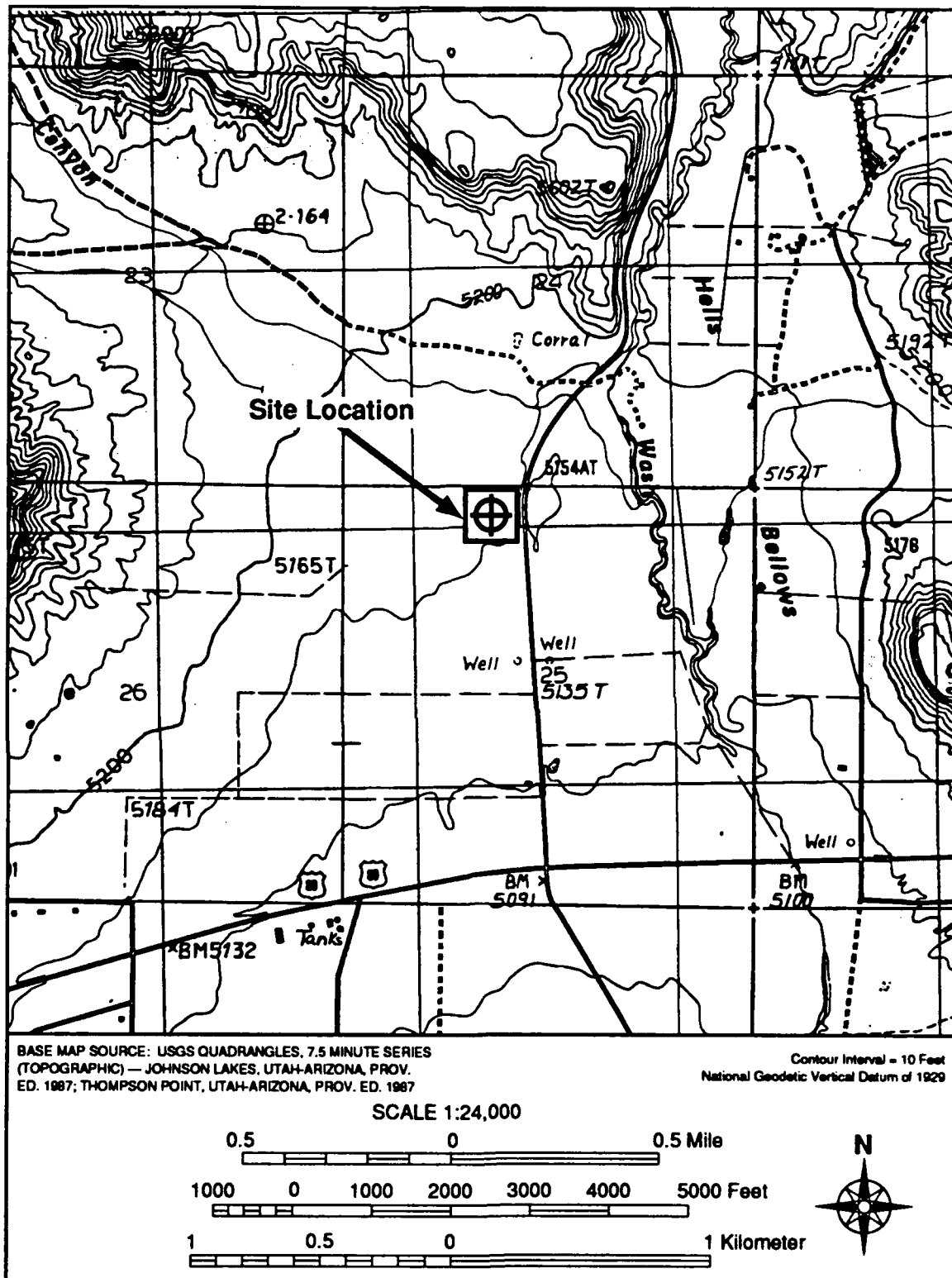


FIGURE B.3 TOPOGRAPHIC SETTING OF THE FRANCIS AND JAMES LTD. SITE (CGS-4)

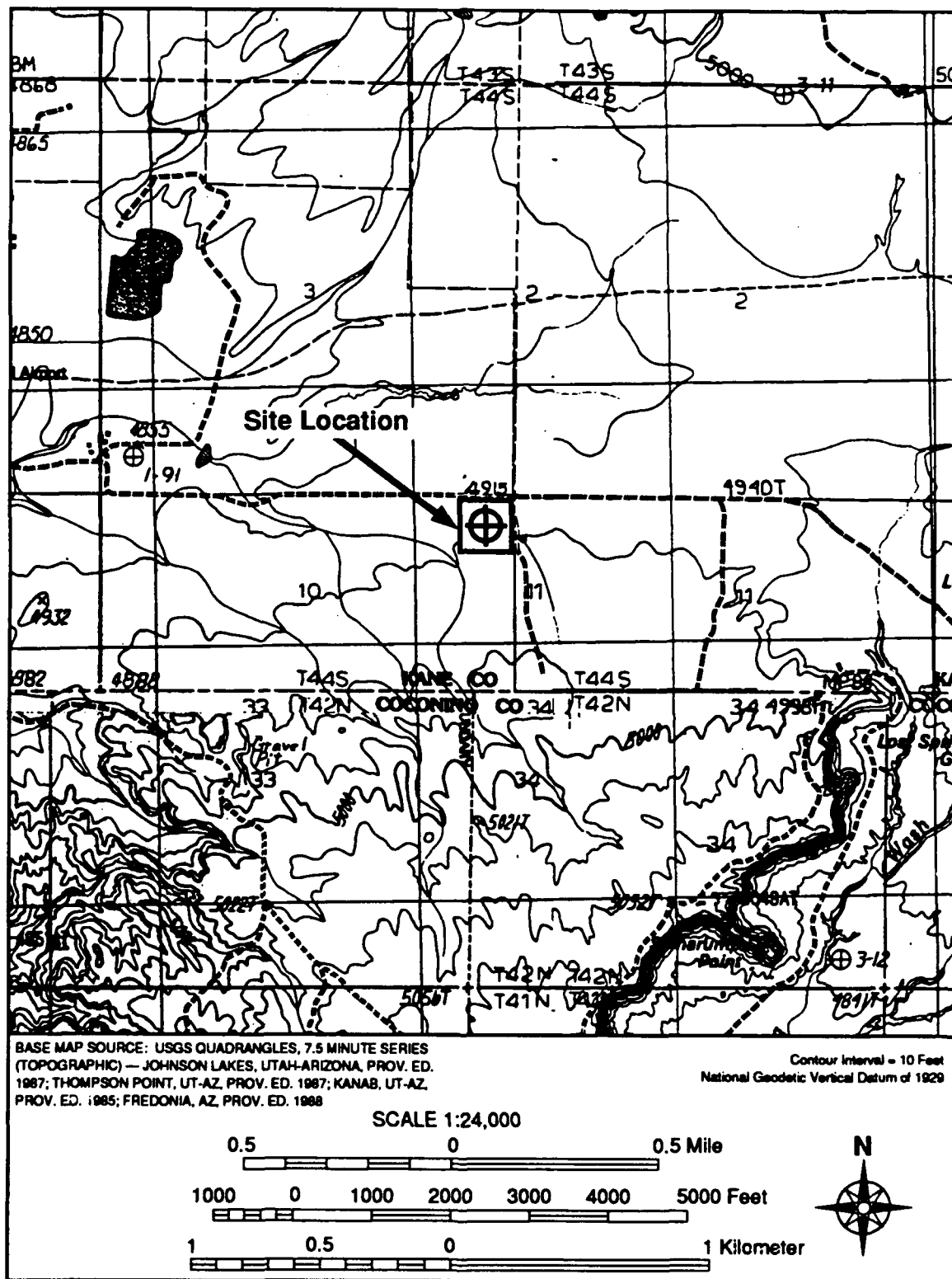


FIGURE B.4 TOPOGRAPHIC SETTING OF THE BLM / CITY OF KANAB  
 SITE (CGS-5)

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION





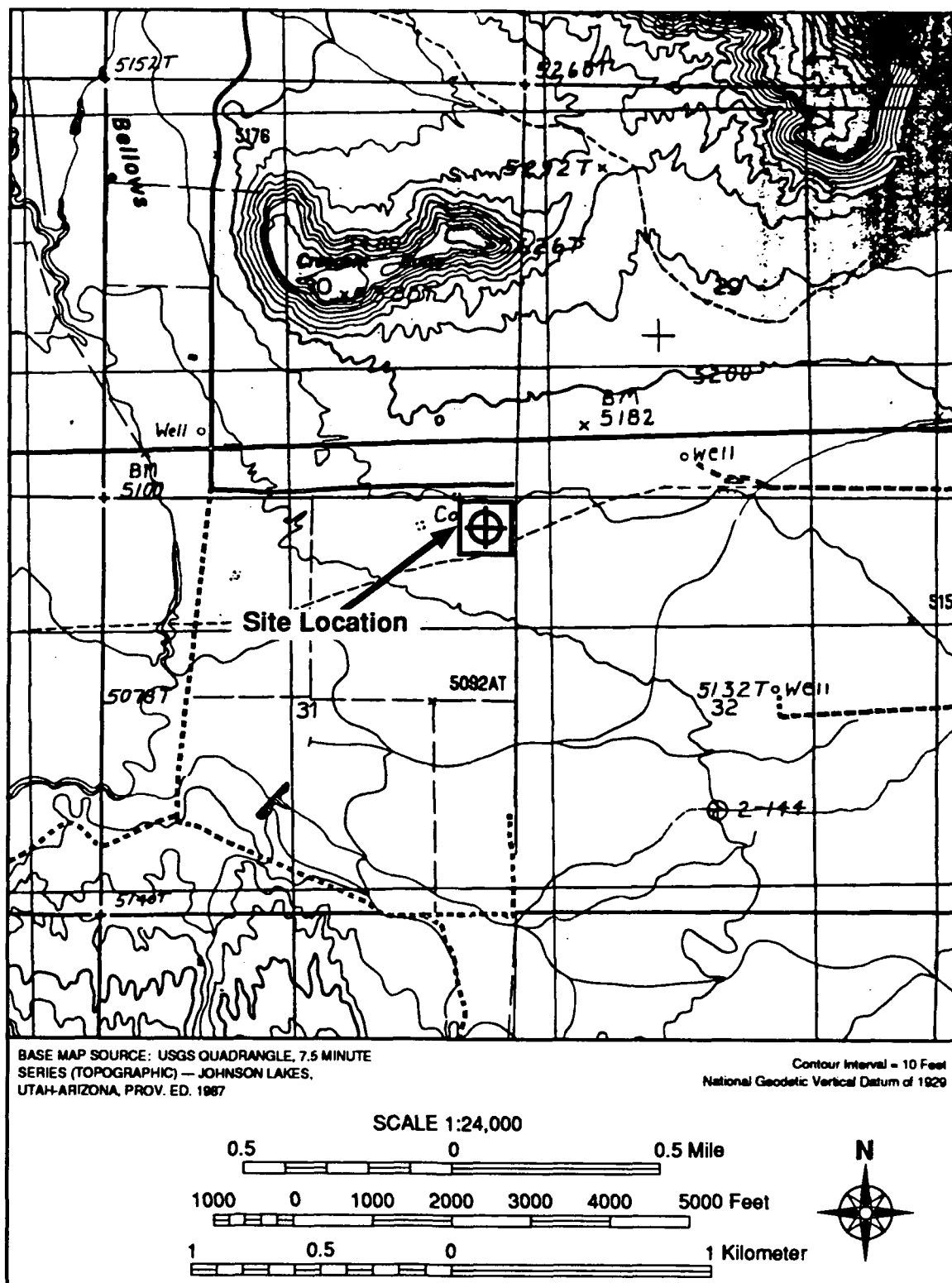


FIGURE B.6 TOPOGRAPHIC SETTING OF THE HAMBLIN SITE (CGS-8)

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION

**APPENDIX C**  
**CORRESPONDENCE**

## CORRESPONDENCE

Appendix C documents contacts with the following federal and state agencies and Native American groups:

<u>Individual Contacted</u>	<u>Agency</u>	<u>Date</u>	<u>Response</u>
Sam F. Spiller, Field Supervisor	U.S. Department of the Interior, Fish and Wildlife Service, Phoenix, Arizona	03-29-90	Attached
		04-29-92	Attached
		01-26-93	Attached
Clark D. Johnson, Assistant Field Supervisor	U.S. Department of the Interior, Fish and Wildlife Service, Salt Lake City, Utah	04-10-90	Attached
		09-11-90	Attached
		07-10-92	Attached
Robert D. Williams, State Supervisor	U.S. Department of the Interior, Fish and Wildlife Service, Salt Lake City, Utah	03-08-93	Attached
Robert E. Gasser, Compliance Coordinator	State Historic Preservation Office, Arizona State Parks	04-19-90	Attached
		02-22-91	Attached
James L. Dykman, Regulation Assistance Coordinator	Division of State History, Utah State Historical Society	08-28-90	Attached
		02-11-91	Attached
		02-15-91	Attached
		04-17-91	Attached
Alan S. Downer, Historic Preservation Officer	The Navajo Nation, Historic Preservation Department, Window Rock, Arizona	09-20-90	Attached
Verlin Smith, Area Manager	U.S. Department of the Interior, Bureau of Land Management, Kanab, Utah	02-26-91	Attached

<u>Individual Contacted</u>	<u>Agency</u>	<u>Date</u>	<u>Response</u>
Bobbie Rogers, Chairperson	Kaibab Paiute Tribal Council, Pipe Springs, Arizona		A letter was sent on 10-10-90 but no written response has been received. Phone communication on 11-05-90.
Geneal Anderson, Chairman	Paiute Tribe of Utah, Cedar City, Utah		A letter was sent on 8-23-90 but no written response has been received. Phone communication on 11-05-90.
Vernon Masayesva, Chairman	The Hopi Tribe, Kykotsmovi, Arizona		A letter was sent on 10-10-90. A response was received on 10-18-90 indicating that comments would follow. No further response has been received.
Danny Quintana, Attorney	Skull Valley Goshute Tribe, Salt Lake City, Utah		A letter was sent on 10-10-90 but no response has been received.
Business Committee	Unitah and Ouray Tribes, Fort Duchesne, Utah		A letter was sent on 10-10-90 but no response has been received.
Carrie Bender, Chairwoman	Hualapai Tribal Council, Peach Tree, Arizona		A letter was sent on 10-10-90 but no response has been received.
Judy Knight-Frank, Chairperson	Ute Mountain Ute Tribe, Towaoc, Colorado		A letter was sent on 10-04-90 but no response has been received.

<u>Individual Contacted</u>	<u>Agency</u>	<u>Date</u>	<u>Response</u>
Leonard Burch, Chairman	Southern Ute Tribe, Ignacio, Colorado		A letter was sent on 10-04-90 but no response has been received.
Ed McElwain, Tribal Planner	Havasupai Tribal Council, Supai, Arizona		A letter was sent on 10-10-90 but no response has been received.
Theodore Smith, Chairman	Yavapai-Apache Community Council, Camp Verde, Arizona		A letter was sent on 08-25-92 but no response has been received to the letter or several attempts at phone communication.



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
ECOLOGICAL SERVICES  
3616 W. Thomas, Suite 6  
Phoenix, Arizona 85019

2-21-90-I-130

March 29, 1990

John W. Ryan  
SRI International  
333 Ravenswood Avenue  
Menlo Park, California 94025

Dear Mr. Ryan:

This responds to your request of March 23, 1990, for information on species listed or proposed to be listed as threatened or endangered that may be in the vicinity of proposed Air Force Ground Wave Emergency Network (GWEN) radio communications relay node sites near Fredonia, Coconino County, Arizona and Kanab, Kane County, Utah.

Our data indicate several listed species may be found in the vicinity of the proposed projects:

Desert tortoise  
Jones cycladenia  
Siler pincushion cactus  
Welsh's milkvetch

Gopherus agassizii  
Cycladenia jonesii var humilis  
Pediocactus sileri  
Asclepias welshii

If we can be of further assistance, please contact Ms. Lesley Fitzpatrick or me (Telephone: 602/379-4720).

Sincerely,

Sam F. Spiller  
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico  
(FWS/HC)



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
FISH AND WILDLIFE ENHANCEMENT  
UTAH STATE OFFICE  
2078 ADMINISTRATION BUILDING  
1745 WEST 1700 SOUTH  
SALT LAKE CITY, UTAH 84104-5110

In Reply Refer To  
(FWE)

April 10, 1990

John W. Ryan  
SRI International  
333 Ravenswood Ave.  
Menlo Park, California 94025

Dear Mr. Ryan:

We have reviewed your letter of March 23, 1990 concerning the U.S. Air Force's proposal to establish a radio communications relay node near Kanab, Utah.

It appears that the following listed endangered and threatened species may occur in the area of influence of this action:

<u>Peregrine falcon</u>	<u>Falco peregrinus</u>
<u>Asclepias welshi</u>	Welsh's milkweed
<u>Cycladenia humilis</u> var. <u>ionesii</u>	Jones cycladenia
<u>Pediocactus sileri</u>	Siler's cactus

We would like to bring to your attention species which are candidates for official listing as threatened or endangered (see Federal Register Vol. 54, No. 4, January 6, 1989 and Federal Register Vol. 55, No. 35, February 21, 1990). While these species have no legal protection under the Endangered Species Act, we ask that you try to avoid them if they are found in the area. Candidate species which may occur in the area of your project are:

<u>Astragalus ampullarius</u>	Gumbo milk-vetch
<u>Cemissonia exilis</u>	no common name
<u>Cryptantha cinerea</u> var. <u>arenicola</u>	no common name
<u>Iris pariensis</u>	paria iris
<u>Jamesia americana</u> var. <u>zionis</u>	no common name
<u>Penstemon ammophilum</u>	no common name
Kanab amber snail	<u>Oxyloma haydeni kanabensis</u>
Ferruginous hawk	<u>Buteo regalis</u>
Spotted Owl	<u>Strix occidentalis</u>
Coral Pink Sand Dune tiger beetle	<u>Cicindela limbata albissima</u>
Spotted bat	<u>Euderma maculatum</u>

The Federal agency permitting or otherwise authorizing your project should review your proposed action and determine if the action would affect any listed species or their critical habitat. If the determination is "may affect" for listed species they must request in writing formal consultation from the Assistant Field Supervisor, U.S. Fish and Wildlife Service (Service) at the address given above. At that time you should provide this office a copy of the



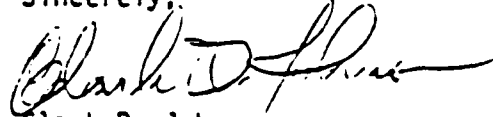
biological assessment and any other relevant information that assisted you in reaching your conclusion.

The Service can enter into formal Section 7 consultation only with another Federal agency. State, county, or any other governmental or private organizations can participate in the consultation process, help prepare information such as the biological assessment, participate in meetings, etc.

Your attention is also directed to Section 7(d) of the Endangered Species Act, as amended, which underscores the requirement that the Federal agency or the applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which, in effect, would deny the formulation or implementation of reasonable and prudent alternatives regarding their actions on any endangered or threatened species.

If you have questions or we can be of further assistance, please advise us. The Service representative who will provide you technical assistance is John L. England of this office (801) 524-4430 or FTS 588-4430.

Sincerely,

A handwritten signature in dark ink, appearing to read "Clark D. Johnson", with a stylized flourish at the end.

Clark D. Johnson  
Acting Field Supervisor



United States Department of the Interior

FISH AND WILDLIFE SERVICE  
FISH AND WILDLIFE ENHANCEMENT  
UTAH STATE OFFICE  
2078 ADMINISTRATION BUILDING  
1745 WEST 1700 SOUTH  
SALT LAKE CITY, UTAH 84104-5110



In Reply Refer To  
(FWE)

September 11, 1990

John W. Ryan  
SRI International  
333 Ravenswood Avenue  
Menlo Park, CA 94025

Dear Mr. Ryan:

We received your letter of August 21, 1990, with the Air Force's attached Preliminary Site Evaluation Report (PSER) concerning the Ground Wave Emergency Network (GWEN) sites in Kane County, Utah.

The U.S. Fish and Wildlife Service concurs with your determination that no Federally listed endangered, threatened or candidate species occur within or will be affected by the construction of the GWEN sites identified in the PSER. If you have any further questions please contact us.

Sincerely,

Clark D. Johnson  
Assistant Field Supervisor



## ARIZONA STATE PARKS

800 W. WASHINGTON  
SUITE 415  
PHOENIX, ARIZONA 85007  
TELEPHONE 602-542-4174

ROSE MOFFORD  
GOVERNOR

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STATE LAND COMMISSIONER

KENNETH E. TRAVOUS  
EXECUTIVE DIRECTOR

COURTLAND NELSON  
DEPUTY DIRECTOR

April 19, 1990

John W. Ryan  
Senior Management Consultant  
SRI International  
333 Ravenswood Avenue  
Menlo Park, CA 94025

RE: Ferdonia, GREW Environmental Investigation, DOD-AF

Dear Mr. Ryan:

Thank you for advising us that the Air Force is planning to install Ground Wave Emergency Network (GWEN) facilities in the vicinity of Ferdonia, Arizona. I have reviewed the documentation that you submitted prior to preparing an Environmental Assessment (EA) and have the following comments pursuant to 36 CFR Part 800:

1. This portion of Arizona is known to contain a variety of prehistoric Anasazi sites. In addition, the area might contain Native American religious sites covered by the American Indian Religious Freedom Act (AIRFA). Although we have no jurisdiction over AIRFA, we recommend that the Air Force consider this aspect of Native American concerns.
2. Due to the possibility of encountering National Register eligible archaeological sites within the proposed project areas, we recommend that once several candidate sites have been selected, these candidate sites should be surveyed by a qualified archaeologist to locate and evaluate any existing cultural remains. Native American groups should also be consulted to determine if any religious sites are within the selected candidate sites.
3. When the archaeological surveys of the candidate sites is completed, please send us a copy of the survey report for our review and comments.

Your cooperation with this office in complying with the historic preservation requirements for Federal projects is appreciated. If you have any questions, please contact me.

Sincerely,

Robert E. Gasser  
Compliance Coordinator

for Shereen Lerner, Ph.D.  
State Historic Preservation Officer



## ARIZONA STATE PARKS

800 W. WASHINGTON  
SUITE 415  
PHOENIX, ARIZONA 85007  
TELEPHONE 602-542-4174

ROSE MOFFORD  
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PHOENIX

M JEAN HASSELL  
STATE LAND COMMISSIONER

KENNETH E. TRAVOUS  
EXECUTIVE DIRECTOR

COURTLAND NELSON  
DEPUTY DIRECTOR

February 22, 1991

John W. Ryan  
Senior Consultant  
SRI International  
333 Ravenswood Avenue  
Menlo Park, CA 94025

RE: Coconino Co., Ground Wave Emergency Network (GWEN), DOD-AF

Dear Mr. Ryan:

Thank you for following-up on our previous correspondence and sending us the results of the environmental studies for the proposed radio communications towers in Kane County, Utah and Coconino County, Arizona. I have reviewed the documentation you submitted and have the following comments pursuant to 36 CFR Part 800, but only as respects the state of Arizona:

Based on the information you provided, it is my opinion that no National Register or eligible properties in Arizona will be affected by the proposed undertaking. Therefore, the Arizona portion of the project should result in a determination of "no effect."

We appreciate your continued cooperation with this office and your assisting the Air Force to meet their historic preservation requirements. If you have any questions, please contact me.

Sincerely,

Robert E. Gasser  
Compliance Coordinator

for Shereen Lerner, Ph.D.  
State Historic Preservation Officer



Norman H. Bangerter  
Governor  
Max J. Evans  
Director

State of Utah  
Division of State History  
(Utah State Historical Society)  
Department of Community and Economic Development

200 E. Grand  
Salt Lake City, Utah 84101-1187  
801-533-5751

August 28, 1990

John W. Ryan  
Senior Management Consultant  
SRI International  
333 Ravenswood Avenue  
Menlo Park, CA 94025

RE: GWEN Project in Kane County

In Reply Please Refer to Case No. M258

Dear Mr. Ryan:

The Utah State Historic Preservation Office received the above referenced report on August 23, 1990. After consideration of the material provided our office offers the following recommendations for the U. S. Air Force.

1. Considering that there is only the preliminary information from BLM surveys, our office would advise that a cultural resource survey of all affected areas may meet legal requirements to take into account effects on cultural resources. The final decision to survey is up to the Air Force or its appointed contractor.

2. A standing structure survey outside the project but within 1.5 miles would probably not provide the Air Force information about cultural resources and how they might be affected by the project.

Enclosed is a list of archaeological contractors qualified to work in Utah. If you have any questions about the recommendations, please let me know.

This information is provided on request to assist the U.S. Air Force in identifying historic properties as specified in 36 CFR 800 for Section 106 responsibilities as specified in 36 CFR 800. If you have questions or need additional assistance, please contact me at (801) 533-7039.

Sincerely,

James L. Dykman  
Regulation Assistance Coordinator

JLD:M258 DOD



Norman H. Bangert  
Governor  
Max J. Evans  
Director

# State of Utah

Division of State History  
(Utah State Historical Society)  
Department of Community and Economic Development

300 Rio Grande  
Salt Lake City, Utah 84101-1162  
801-533-5755

FAX 801-364-6436

February 11, 1991

John W. Ryan  
Senior Consultant  
SRI International  
333 Ravenswood Avenue  
Menlo Park, CA 94025

RE: United States Air Force Ground Wave Emergency Network Project, Southern Utah (Kane County) Relay Node

In Reply Please Refer to Case No. M258

Dear Mr. Ryan:

The Utah State Historic Preservation Office received the above referenced report on February 5, 1991. The report states that seven cultural sites were recorded within the project impact area; [42KA 3688-3691, 3707-3709]. We concur with your recommendation that 42KA3688, 3690, 3691, 3708, are Eligible for the National Register of Historic Places. We also understand that all sites will be avoided during construction.

Technical comment: in reading the report, the contractor does not indicate that missing site 3690 would be easy, and Hauck recommends a testing program for site 42KA3690 if GWEN 2 site is used. Your letter does not indicate how far the site will be avoided or if your contractor has had a chance to consider the move of GWEN 2.

I would recommend that you review with your cultural resource contractor the purposed change and have his recommendations. We, therefore, concur with your recommendation that there will be No Effect as a result of this project on sites 42KA3688, 3691 and 3708.

This information is provided on request to assist the Air Force with its Section 106 responsibilities as specified in 36 CFR 800. If you have questions or need additional assistance, please contact me at (801) 533-7039.

Sincerely,

  
James L. Dykman  
Regulation Assistance Coordinator

JLD:M258 DOD/NE/DOEx3

C-12



Norman H. Bangerter  
Governor  
Max J. Evans  
Director

# State of Utah

Division of State History  
(Utah State Historical Society)  
Department of Community and Economic Development

300 Rio Grande  
Salt Lake City Utah 84101-1182  
801-533-5755

FAX 801-364-6436

February 15, 1991

Buford Holt  
Senior Consultant  
SRI International  
333 Ravenswood Avenue  
Menlo Park, CA 94025

RE: 919 South Utah, GS-2 Boundary Change

In Reply Please Refer to Case No. M258

Dear Mr. Holt:

The Utah State Historic Preservation Office received the above referenced additional information on February 13, 1991. After review of the additional information about 42KA 3690; our office would concur with a determination of No Effect on the site, based on avoidance.

This information is provided on request to assist with its Section 106 responsibilities as specified in 36 CFR 800. If you have questions or need additional assistance, please contact me at (801) 533-7039.

Sincerely,

James L. Dykman  
Regulation Assistance Coordinator

JLD:M258 DOD/NE

C-13



RECEIVED APR 11 1991

April 10, 1991

Mr. James L. Dykman  
Regulation Assistance Coordinator  
Utah State Historic Preservation Office  
Utah State Historical Society  
300 Rio Grande  
Salt Lake City, Utah 84101-1182

M258

Re: United States Air Force Ground Wave Emergency Network Project  
Southern Utah (Kane County) Relay Node ( SHPO Case No. M258)

Dear Mr. Dykman:

After reviewing your letters of February 11, 1991 and February 15, 1991, the United States Air Force has requested clarification of your concurrence with SRI's finding of no significant impact on cultural resources in the vicinity of the six candidate sites for the proposed GWEN radio communications tower in southern Utah (Kane County) that would be part of the Ground Wave Emergency Network (GWEN) project.

### Review of Findings

As stated in my letter of January 29, 1991, SRI concluded that construction of the GWEN tower on any of the six candidate sites would have no significant impact on cultural resources. The prehistoric resources could be avoided by altering the boundary of CGS-2 and by monitoring construction to ensure neither 42KA 3690 nor 42KA 2342 is disturbed during construction. Similarly, powerline construction for CGS-8 can easily avoid the prehistoric properties. Impacts on historic properties would not be significant because setting is not important to the potential eligibility of the historic properties identified.

### Air Force Concerns

With respect to CGS-2, the BLM site, the Air Force is concerned that I did not clearly describe the situation regarding the CGS-2 boundary and fencing at the CGS. The fence installed at the GWEN relay nodes surrounds the ground plane in circular fashion 330 feet from the base of the tower. Therefore, both the fence and the ground plane would avoid 42KA 3690. Note that this differs from the depiction of the fence provided in my facsimile to you on February 13, 1991. Given this clarification, the AF would like explicit concurrence with the determination of no effect on the archaeological site 42KA 3690, identified by Dr. Hauck.

Furthermore, archaeological site 42KA 2342, which is approximately 82 feet from the southeast corner of CGS-2, was not explicitly cleared in either of your letters. As with 42KA 3690, this site would be avoided during construction of the GWEN tower, ground plane, and circular fence.

Additionally, 42KA 1596 and 42KA 2345, which lie in the powerline corridor for CGS-8, were not explicitly cleared in either of your letters. As pointed out by Dr. Hauck, these sites have been previously disturbed by construction of the dirt road and powerline. If CGS-8 is selected, there would be no impact on these prehistoric sites because in upgrading the powerline to three-phase power, either the same poles would be used or, if any new poles are required, they would be placed to avoid the archaeological sites.

**SRI International**

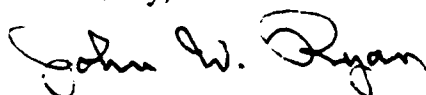
333 Ravenswood Ave. • Menlo Park, CA 94025 • (415) 326-6200 • TWX 910-373-2046 • Telex 334486 • Facsimile (415) 326-5512



Given this further discussion, the AF would like your explicit concurrence with our determination of no significant impacts on 42KA 2342, 42KA 1596, and 42KA 2345.

Thank you for your patient assistance with our project. If you have need of further information, please call me at (414) 859-3511. My facsimile number is (415) 326-5512.

Sincerely,



John W. Ryan  
Senior Consultant

**CONCUR**

**APR 17 1991**

**UTAH STATE HISTORIC  
PRESERVATION OFFICE**

BY



**JAMES L. DYKMAN**

**Regulation Assistance Coordinator**

# THE NAVAJO NATION

Leonard Haskie  
Interim President  
Navajo Nation



Irving Billy  
Interim Vice President  
Navajo Nation

Historic Preservation Department  
P.O. Box 2898  
Window Rock, AZ 86515

September 20, 1990

John W. Ryan  
SRI International  
333 Ravenswood Avenue  
Menlo Park, Calif. 94025

Dear Mr. Ryan:

We have received your letter of August 23 requesting information on Native American Concerns about six candidate GWEN sites for the Air Force in southern Utah near Kanab. This office has no record of any places of sacred or traditional significance to Navajos in the Kanab vicinity. We recommend, however, that, if possible, your staff (preferably a professionally qualified anthropologist) consult Navajos living in or near Kanab to determine any such concerns they might have.

In the unlikely event that Navajo graves are encountered, we have enclosed a copy of the Navajo Nation's policy on the treatment of graves, cemeteries, and human remains, which should be followed in treating such graves.

Sincerely,

A handwritten signature in dark ink, appearing to read "Alan S. Downer".  
Alan S. Downer  
Navajo Nation Historic Preservation Officer

encl

cc: Grace Lawrence, Interim President's Office  
Peter Deswood, Div. of Natural Resources



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

KANAB RESOURCE AREA  
318 NORTH FIRST EAST  
KANAB, UTAH 84741

AMERICA  
[REDACTED]

8100  
UT-046

February 26, 1991

John W. Ryan  
Senior Management Consultant  
SRI International  
333 Ravenswood Ave.  
Menlo Park, CA 94025

Dear Mr. Ryan:

We are in receipt of the report by Archeological- Environmental Research Corporation entitled Cultural Resource Evaluations of Six Candidate GWEN Tower Locations in the Kanab - Hells Bells Localities. As our archeologist Doug McFadden recently told you on the phone, the report is adequate for our needs and we concur with your findings.

In order to complete our evaluation and update our records we require copies of the IMAC's site forms and a distribution list for the report. Please contact Doug McFadden at (801) 644-2672 if you have any questions.

Sincerely,

Verlin Smith  
Area Manager



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
ECOLOGICAL SERVICES  
3616 W. Thomas, Suite 6  
Phoenix, Arizona 85019

2-21-90-I-130

April 29, 1992

Lt. Colonel Stephen T. Martin  
Department of the Air Force  
Headquarters Electronic Systems Division  
Hanscom Air Force Base, Mass 01731-5000

Dear Colonel Martin;

This letter is in response to your request of April 23, 1992, for an updated species list for the proposed Ground Wave Emergency Network (GWEN) radio communications relay node site near Fredonia, Coconino County, Arizona.

The species list from March 29, 1990, has been updated to include one listed and several candidate species. In addition, one listed species, the Mohave desert tortoise, has been deleted from the list. The current list is as follows:

Endangered

Kanab ambersnail (Oxyloma haydeni kanabensis)  
Siler pincushion cactus (Pediocactus sileri)

Threatened

Welsh's milkweed (Asclepias welshii)  
Jones cycladenia (Cycladenia humilis var. ionesii)

Category 1

Fickeisen pincushion cactus (Pediocactus peeblesianae var. fickeiseniae)

Category 2

Chuckwalla (Sauromalus obesus)  
Spotted bat (Euderma maculatum)  
Gumbo milk vetch (Astragalus ampullarius)  
No common name (Camissonia exilis)  
No common name (Cryptantha cinerea var. arenicola)  
Morton wild buckwheat (Eriogonum mortonianum)  
Atwood wild buckwheat (Eriogonum thompsonae var. atwoodii)

Endangered and threatened species are protected by federal law and must be considered prior to project development. Candidate species are those which may be considered for listing as endangered or threatened in the future.

Category 1 candidates are those which the Fish and Wildlife Service has enough information to support proposing to list. Category 2 species are those for which there is not sufficient information to support proposing. While candidate species are not protected under federal law, we would appreciate your consideration of them during project development. We would also like to receive any information on these species in your project area.

Arizona protects some species not included under federal law. We suggest you contact the Arizona Game and Fish Department for State-listed or sensitive species in the project area. We also recommend that you contact the Arizona Department of Agriculture to determine if permits are required under the Arizona Native Plant Law.

In future communications about this project, please refer to 2-21-90-I-130. If we can be of further assistance, contact Julie Fulkerson or Ren Lohofener (Telephone 602/379-4720).

Sincerely,



Sam F. Spiller  
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico  
(AWE)  
Field Supervisor, Fish and Wildlife Service, Salt Lake City, Utah  
Director, Arizona Game and Fish Department, Phoenix, Arizona  
Plant Program Manager, Arizona Department of Agriculture, Phoenix,  
Arizona



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
FISH AND WILDLIFE ENHANCEMENT  
UTAH STATE OFFICE  
2078 ADMINISTRATION BUILDING  
1745 WEST 1700 SOUTH  
SALT LAKE CITY, UTAH 84104-5110



In Reply Refer To

(FWE)

July 10, 1992

Stephen T. Martin, Lt. Col, USAF  
Program Manager, GWEN  
Department of the Air Force  
Headquarters Electronic Systems Division (AFSC)  
Hanscom Air Force Base, Massachusetts 01731-5000

Dear Lt. Col. Martin:

We have reviewed your letter of June 15, 1992 concerning the U.S. Air Force's Ground Wave Emergency Network (GWEN) project in southern Utah.

It appears that the following listed and proposed endangered and threatened species may occur in the area of influence of this action:

<u>Peregrine falcon</u>	<u>Falco peregrinus</u>
<u>Asclepias welshi</u>	Welsh's milkweed
<u>Cycladenia humilis</u> var. <u>ionesii</u>	Jones cycladenia
<u>Pediocactus sileri</u>	Siler's cactus
Kanab ambersnail	<u>Oxyloma haydeni kanabensis</u>
Mexican Spotted owl	<u>Strix occidentalis lucida</u>

We would like to bring to your attention species which are candidates for official listing as threatened or endangered (see Federal Register Vol. 54, No. 4, January 6, 1989 and Federal Register Vol. 55, No. 35, February 21, 1991). While these species have no legal protection under the Endangered Species Act, we ask that you try to avoid them if they are found in the area. Candidate species which may occur in the area of your project are:

<u>Astragalus ampullarius</u>	Gumbo milk-vetch
<u>Camissonia exilis</u>	no common name
<u>Cryptantha cinerea</u> var. <u>arenicola</u>	no common name
<u>Iris pariensis</u>	paria iris
<u>Jarresia americana</u> var. <u>zionis</u>	no common name
<u>Penstemon ammophilum</u>	no common name
Ferruginous hawk	<u>Buteo regalis</u>
Coral Pink Sand Dune tiger beetle	<u>Cicindela limbata albissima</u>
Spotted bat	<u>Euderma maculatum</u>

The Federal agency permitting or otherwise authorizing your project should review your proposed action and determine if the action would affect any listed species or their critical habitat. If the determination is "may affect" for listed species they must request in writing formal consultation from the Assistant Field Supervisor, U.S. Fish and Wildlife Service (Service) at the address given above. At that time you should provide this office a

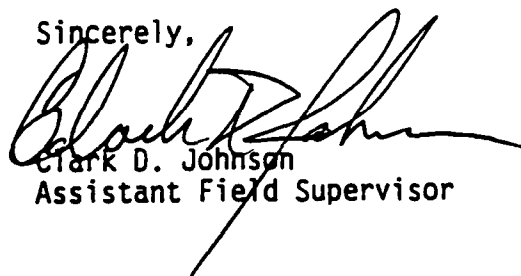
copy of the biological assessment and any other relevant information that assisted you in reaching your conclusion.

The Service can enter into formal Section 7 consultation only with another Federal agency. State, county, or any other governmental or private organizations can participate in the consultation process, help prepare information such as the biological assessment, participate in meetings, etc.

Your attention is also directed to Section 7(d) of the Endangered Species Act, as amended, which underscores the requirement that the Federal agency or the applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which, in effect, would deny the formulation or implementation of reasonable and prudent alternatives regarding their actions on any endangered or threatened species.

If you have questions or we can be of further assistance, please advise us. The Service representative who will provide you technical assistance is John L. England of this office (801) 524-4430.

Sincerely,

A handwritten signature in black ink, appearing to read "Clark D. Johnson", is written over the typed name and title.

Clark D. Johnson  
Assistant Field Supervisor

United States Department  
of the Interior  
Fish and Wildlife Service  
Ecological Services  
Attn: Mr Sam F. Spiller  
3616 W. Thomas, Suite 6  
Phoenix, AZ 85019

RE: U.S. Air Force Ground Wave Emergency Network (GWEN) Project  
in Southern Utah

---

This is to verify that no changes have been made to the list of  
federally-designated threatened, endangered, or candidate species  
sent on April 29, 1992.

  
\_\_\_\_\_  
Sam F. Spiller

1/26/93  
Date

---

Changes have been made to the list of federally-designated  
threatened, endangered, or candidate species since our  
correspondence to you on April 29, 1992. Enclosed is a new list  
of species.

\_\_\_\_\_  
Sam F. Spiller

\_\_\_\_\_  
Date





United States Department of the Interior  
*FISH AND WILDLIFE SERVICE*

UTAH STATE OFFICE  
2060 ADMINISTRATION BUILDING  
1745 WEST 1700 SOUTH  
SALT LAKE CITY, UTAH 84104-5110



In Reply Refer To  
(ES)

March 8, 1993

Stephen T. Martin, Lt. Col., USAF  
Program Manager, GWEN  
Department of the Air Force  
Headquarters Electronic Systems Division (AFSC)  
Hanscom Air Force Base, Massachusetts 01731-5000

Dear Colonel Martin:

We have received and reviewed your letter of December 17, 1992 requesting an update of the endangered species list we sent you on July 10, 1992. The species list of July 10, 1992 remains current as of this date. If you have any further questions please contact us.

Sincerely,

Robert D. Williams  
State Supervisor

**APPENDIX D**

**GLOSSARY**

## **GLOSSARY**

### **Abbreviations and Units of Measure**

<b>AM</b>	<b>Amplitude modulation</b>
<b>ATU</b>	<b>Antenna tuning unit</b>
<b>BIA</b>	<b>Bureau of Indian Affairs</b>
<b>BLM</b>	<b>Bureau of Land Management</b>
<b>BUPG</b>	<b>Back-up power group</b>
<b>CGS</b>	<b>Candidate GWEN site</b>
<b>dba</b>	<b>Decibels on the A-weighted scale, which is a measure of the intensity of the sounds people can hear</b>
<b>EA</b>	<b>Environmental Assessment</b>
<b>FAA</b>	<b>Federal Aviation Administration</b>
<b>FEIS</b>	<b>Final Environmental Impact Statement; in this document, the term refers to the FEIS for the GWEN Final Operational Capability that was released in September 1987 by the U.S. Air Force, Electronic Systems Division, Hanscom Air Force Base, Massachusetts</b>
<b>FIA</b>	<b>Federal Insurance Administration</b>

<b>FICWD</b>	<b>Federal Interagency Committee on Wetland Delineation</b>
<b>FOC</b>	<b>Final Operational Capability, the third phase of development of GWEN</b>
<b>GPO</b>	<b>Government Printing Office</b>
<b>GWEN</b>	<b>Ground Wave Emergency Network</b>
<b>HEMP</b>	<b>High-altitude electromagnetic pulse</b>
<b>kHz</b>	<b>Kilohertz</b>
<b>LF</b>	<b>Low frequency</b>
<b>mg/l</b>	<b>Milligrams per liter</b>
<b>MM</b>	<b>Modified Mercalli, a scale of the severity of earthquake effects</b>
<b>MSL</b>	<b>Mean sea level</b>
<b>µg/l</b>	<b>Micrograms per liter</b>
<b>NOAA</b>	<b>National Oceanic and Atmospheric Administration</b>
<b>NRC</b>	<b>National Research Council, the principle operating agency of the National Academy of Sciences and the National Academy of Engineering</b>
<b>NRHP</b>	<b>National Register of Historic Places</b>

<b>PAWS</b>	Potential areawide sites; the portion(s) of an SSA left after application of those siting criteria that do not require a field survey, such as the location of national and state parks
<b>PCGS</b>	Potential candidate GWEN site; any site that is identified from roadside surveys as suitable for further investigation
<b>PGS</b>	Preferred GWEN site; the CGS identified by the Government that represents the Government's preferred location for a relay tower
<b>ppb</b>	Parts per billion
<b>ppm</b>	Parts per million
<b>PSER</b>	Preliminary Site Evaluation Report
<b>ROE</b>	Right-of-entry
<b>SCS</b>	Soil Conservation Service, a unit of the United States Department of Agriculture
<b>SHPO</b>	State Historic Preservation Officer; the person responsible for administering the National Historic Preservation Act at the state level, reviewing National Register of Historic Places nominations, maintaining data on historic properties that have been identified but not yet nominated, and consulting with federal agencies concerning the impacts of proposed projects on known and unknown cultural resources
<b>SSA</b>	Site search area; the 250-square-mile area within which four to six CGSs are identified; the SSA is the area within a 9-mile radius of a set of nominal coordinates in the network design. It is used as a manageable range in which to conduct siting investigations

TLCC	Thin Line Connectivity Capability; the second phase of development of GWEN
UDCED	Utah Department of Community and Economic Development
UDT	Utah Department of Transportation
UHF	Ultrahigh frequency (band); specifically 300 to 3,000 megahertz
USAF	United States Air Force
USBEA	United States Bureau of Economic Analysis
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTC	Utah Travel Council
VMC	Visual Modification Class
VRM	Visual Resource Management (Class)
ZNHA	Zion Natural History Association

## **Definitions**

Aerie	The nest of a bird on a cliff or a mountaintop
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Air pollutant	An atmospheric contaminant, particularly the 15 atmospheric contaminants specified in federal and most state regulations
Alluvial	Pertaining to loose river sediments, such as clay, silt, sand, and gravel
Anasazi	A prehistoric Native American group, best known for their fine pottery and unique cliff dwellings, that existed in the southwest region of the United States 700 to 1,550 years ago
Aquifer	A water-bearing stratum of permeable rock, sand, or gravel
Archaic period	A prehistoric American cultural period, approximately 8,000 to 1,600 years ago
Artesian well	A deep-bored well where internal pressure makes the water flow upward like a fountain
Avian	Pertaining to birds
Candela	A unit of measure of the intensity of light equal to the brightness of one candle
Chinle formation	The uppermost Triassic unit exposed in Kane County, Utah, composed of two members: the Shinarump and the Petrified Forest
Class III	A division of a Phase I archaeological survey. A Phase I survey is often divided into Class I, a literature review and search; Class II, a sample survey; and Class III, a 100 percent survey
Cultural resource	Prehistoric, Native American, and historic sites, districts, buildings, structures, objects, and any other physical evidence of past human activity

<b>Ecosystem</b>	The complex of a community and its environment functioning as an ecological unit in nature
<b>Eolian</b>	Borne, deposited, produced, or eroded by the wind
<b>Escarpment</b>	A steep slope resulting from erosion or faulting that separates two comparatively level surfaces
<b>Evaluative criteria</b>	Applied to portions of a potential siting area for a GWEN facility to determine its suitability. Areas that rank low against evaluative criteria may be excluded from consideration, or given a low priority in the site selection process
<b>Exclusionary criteria</b>	Criteria used to eliminate or exclude highly sensitive areas or areas that do not meet the limits of acceptable performance from consideration for GWEN facilities
<b>Fault</b>	A break in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust; adjacent surfaces are differentially displaced parallel to the plane of fracture
<b>Federal jurisdictional wetland</b>	As defined in the <i>Federal Manual for Identifying and Delineating Jurisdictional Wetlands</i> (GPO 1989-236-985/00336), a wetland is a class of habitats distinguished by the presence of saturation to the surface or standing water during at least 1 week of the growing season (wetland hydrology), a soil type characteristic of saturated or poorly drained conditions (hydric soils), and the predominance of plants that only or mostly occur on wet sites (hydrophytic vegetation)
<b>Floodplain</b>	Land adjacent to a river which is commonly covered by water during high flow periods



<b>Forb</b>	A herbaceous plant other than a grass, especially one growing in a field or meadow
<b>Formative period</b>	A prehistoric American cultural period, approximately 1,600 to 850 years ago
<b>Fugitive dust</b>	Windblown dust
<b>Great Basin</b>	A physiographic region of the United States characterized by lack of external drainage. Portions of the Great Basin are found in Nevada, Western Utah, California, Wyoming and Arizona
<b>Ground plane</b>	A part of the antenna system consisting of buried copper wires that extend radially from the base of a GWEN tower for a distance of approximately 330 feet
<b>Habitat</b>	The place normally occupied by an organism
<b>Historic properties</b>	For purposes of this EA, historic properties are those aboveground structures and resources that are listed or eligible for listing on the National Register of Historic Places
<b>Hydric soil</b>	A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part

<b>Modified Mercalli scale</b>	A measure of the intensity of seismic activity based on human perception of the event and the potential for damage; the intensity is rated on a Roman numeral scale ranging from I to XII. An earthquake of MM intensity I would be detectable only by seismographs; MM intensity V would shake buildings, break dishes and glassware, and cause unstable objects to fall; MM intensity X would destroy most masonry and frame structures, bend railroad rails slightly, and cause large tidal waves and landslides; MM intensity XII would cause nearly total destruction of all buildings. Another commonly used seismic intensity scale, the Richter scale, is based on readings from a seismograph, an instrument only used since 1935. The Modified Mercalli scale is commonly used when the historic period to be covered includes data before 1935
<b>Native American</b>	A generalized reference to an individual whose ancestry may be traced to one of the indigenous American cultures
<b>Nomadic</b>	Roaming about from place to place usually seasonally and within a well-defined territory in order to secure a food supply
<b>Paleo-Indian period</b>	A prehistoric American cultural period, approximately 12,000 to 8,000 years ago
<b>Paleonto- logical</b>	Pertaining to fossils or the study of fossils
<b>pH</b>	A measure of acidity in which the lower the number, the more acidic the substance; 7 represents neutrality
<b>Phase I survey</b>	A survey designed to identify properties that are listed, eligible for listing, or potentially eligible for listing on the National Register of Historic Places within the area that would be affected by a proposed project

<b>Prime farmland</b>	Land that contains soils having high crop production either naturally or through modification; the U.S. Soil Conservation Service is responsible for designating prime farmland
<b>Quaternary period</b>	The geologic period of time extending from 2 million years ago to the present
<b>Raptor</b>	Bird of prey, such as hawk, eagle, and owl
<b>Riparian</b>	Pertaining to the bank of a natural course of water
<b>Scenic backway</b>	A designation by the Utah Travel Council to specify unpaved, limited-access roads with high scenic value that include recreational, historical, wildlife, educational, geological, scientific, or cultural features of more than local significance
<b>Scenic highway</b>	A designation by the Utah Travel Council to specify paved, all-vehicle roads with high scenic value that include recreational, historical, wildlife, educational, geological, scientific, or cultural features of more than local significance
<b>Swale</b>	A slight depression, sometimes swampy, in the midst of generally level land
<b>Top-loading element</b>	Portions of the antenna that extend diagonally from the top of the tower, which strengthen the signal and provide additional structural support like guy wires
<b>Triassic period</b>	The geologic period of time extending from 250 to 205 million years ago

Visual Resource Management Class II	A BLM visual resource rating which allows low changes to the existing character of the landscape. The objective of this class is to retain the existing character of the landscape, meaning that activities may be seen but should not attract the attention of the casual observer
Visual Resource Management Class III	A BLM visual resource rating. The objective of this class is to partially retain the existing character of the landscape, meaning that activities under this objective may attract attention but should not dominate the view of the casual observer
Visual Resource Management Class IV	A BLM visual resource rating. The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. Activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repetition of basic elements